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THE ROUND OF LIFE.

Two children down by the shining strand,
With eyes as blue as the summer sea,
While the sinking sun fills all the land
With the glow of a golden mystery:
Laughing aloud at the sea-mew's cry,
Gazing with joy on its snowy breast,
Till the first star looks from the evening sky,
And the amber bars stretch over the west.

A soft green dell by the breezy shore,
A sailor lad and a maiden fair;
Hand clasped in hand, while the tale of yore
Is borne again on the listening air.
For love is young, though love be old,
And love alone the heart can fill;
And the dear old tale that has been told
In the days gone by, is spoken still.

A trim-built home on a sheltered bay;
A wife looking out on the glistening sea;
A prayer for the loved one far away,
And prattling imps 'neath the old roof-tree;
A lifted latch and a radiant face
By the open door in the falling night;
A welcome home and a warm embrace
From the love of his youth and his children bright.

An aged man in an old armchair;
A golden light from the western sky;
His wife by his side, with her silvered hair,
And the open book of God close by.
Sweet on the bay the gloaming falls,
And bright is the glow of the evening star;
But dearer to them are the jasper walls
And the golden streets of the land afar.

An old churchyard on a green hillside,
Two lying still in their peaceful rest;
The fishermen's boats going out with the tide
In the fiery glow of the amber west.
Children's laughter and old men's sighs,
The night that follows the morning clear,
A rainbow bridging our darkened skies,
Are the round of our lives from year to year!

Chambers' Journal. ALEXANDER LAMONT.

ENGLAND TO AMERICA.

JAMES ABRAM GARFIELD.

BORN, NOVEMBER 19, 1831.

DIED, PRESIDENT OF THE UNITED STATES, SEPTEMBER 19, 1881.

SILENCE were best, if hand in hand,
Like friends, sea-sundered peoples met;
But words must wing from land to land
The utterance of the heart's regret,
Though harsh on ears that Sorrow thralls
E'en Sympathy's low accent falls.

Salt leagues that part us check no whit
What knows not bounds of time or space,
The homestead feeling that must knit
World-scattered kin in speech and race.
None like ourselves may well bemoan
Columbia's sorrow; 'tis our own.

A sorrow of the nobler sort,
Which love and pride make pure and fair;
A grief that is not misery's sport,
A pain that bows not to despair;
Beginning not in courtly woe,
To end in pageantry and show.

The great republic's foremost son,
Struck foully, falls; but they who mourn
Brave life cut short, good work half done,
Yet trust that from beyond death's bourne
That blameless memory's gifts may be
Peace, concord, civic purity.

Scarce known of us till struck for death,
He stirred us by his valiant fight
With mortal pain. With bated breath,
We waited tidings morn and night.
The hope that's nursed by strong desire,
Though shaken often, will not tire.

And now our sables type, in truth,
A more than ceremonial pain.
We send, court, cottage, age, and youth,
From open hearts, across the main,
Our sympathy — it never swerved —
To wife he loved, to land he served!

Punch.

PASSING AND GLASSING.

ALL things that pass
Are woman's looking-glass;
They show her how her bloom must fade,
And she herself be laid
With withered roses in the shade;
With withered roses and the fallen peach,
Unlovely, out of reach
Of summer joy that was.

All things that pass
Are woman's tiring-glass;
The faded lavender is sweet,
Sweet the dead violet,
Culled and laid by and cared for yet;
The dried-up violets and dried lavender
Still sweet, may comfort her,
Nor need she cry, Alas!

All things that pass
Are wisdom's looking-glass;
Being full of hope and fear, and still
Brimful of good or ill,
According to our work and will;
For there is nothing new beneath the sun,
Our doings have been done,
And that which shall be was.

MISS ROSSETTI.

From Nature.

INAUGURAL ADDRESS

BY SIR JOHN LUBBOCK

AT THE JUBILEE MEETING OF THE BRITISH ASSOCIATION AT YORK, 27 SEPT., 1881.

In the name of the British Association, which for the time I very unworthily represent, I beg to tender to you, my Lord Mayor, and through you to the city of York, our cordial thanks for your hospitable invitation and hearty welcome.

We feel, indeed, that in coming to York we are coming home: gratefully as we acknowledge and much as we appreciate the kindness we have experienced elsewhere, and the friendly relations which exist between this Association and most — I might even say, all — our great cities, yet Sir R. Murchison truly observed at the close of our first meeting in 1831, that to York, "as the cradle of the Association, we shall ever look back with gratitude; and whether we meet hereafter on the banks of the Isis, the Cam, or the Forth, to this spot we shall still fondly revert." Indeed, it would have been a matter of much regret to all of us, if we had not been able on this, our fiftieth anniversary, to hold our meeting in our mother city.

My Lord Mayor, before going further, I must express my regret, especially when I call to mind the illustrious men who have preceded me in this chair, that it has not fallen to one of my eminent friends around me, to preside on this auspicious occasion. Conscious, however, as I am of my own deficiencies, I feel that I must not waste time in dwelling on them, more especially as in doing so I should but give them greater prominence. I will, therefore, only make one earnest appeal to your kind indulgence.

The connection of the British Association with the city of York does not depend merely on the fact that our first meeting was held here. It originated in a letter addressed by Sir D. Brewster to Prof. Phillips, as secretary to your York Philosophical Society, by whom the idea was warmly taken up. The first meeting was held on September 26, 1831, the chair being taken by Lord Milton, who delivered an address, after which Mr. William Vernon Harcourt, chairman of the Committee of Management, submitted to the meeting a code of rules which had been so maturely considered, and so wisely framed, that they have remained substantially the same down to the present day.

The constitution and objects of the Association were so ably described by Mr. Spottiswoode, at Dublin, and are so well known to you, that I will not dwell on them this evening. The excellent president of the Royal Society, in the same address, suggested that the past history of the Association would form an appropriate theme for the present meeting. The history of the Association, however, is really the history of science, and I long shrank from the attempt to give even a panoramic survey of a subject so vast and so difficult; nor should I have ventured to make any such attempt, but that I knew I could rely on the assistance of friends in every department of science.

Certainly, however, this is an opportunity on which it may be well for us to consider what have been the principal scientific results of the last half-century, dwelling especially on those with which this Association is more directly concerned, either as being the work of our own members, or as having been made known at our meetings. It is of course impossible within the limits of a single address to do more than allude to a few of these, and that very briefly. In dealing with so large a subject I first hoped that I might take our annual volumes as a text-book. This, however, I at once found to be quite impossible. For instance, the first volume commences with a report on Astronomy by Sir G. Airy; I may be pardoned, I trust, for expressing my pleasure at finding that the second was one by my father, on the tides, prepared like the preceding at the request of the Council; then comes one on meterology by Forbes, radiant heat by Baden Powell, optics by Brewster, mineralogy by Whewell, and so on. My best course will therefore be to take our different sections one by one, and endeavor to bring before you a few of the principal results which have been obtained in each department.

The Biological Section is that with which I have been most intimately associated, and with which it is, perhaps, natural that I should begin.

Fifty years ago it was the general opinion that animals and plants came into existence just as we now see them. We took pleasure in their beauty; their adaptation to their habits and mode of life in many cases could not be overlooked or misunderstood. Nevertheless, the book of nature was like some richly illuminated missal, written in an unknown tongue: the graceful forms of the letters, the beauty of the coloring, excited our wonder and admiration; but of the true meaning little was known to us; indeed we scarcely realized that there was any meaning to decipher. Now glimpses of the truth are gradually revealing themselves; we perceive that there is a reason — and in many cases we know what that reason is — for every difference in form, in size, and in color; for every bone and every feather, almost for every hair. Moreover, each problem which is solved opens out vistas, as it were, of others perhaps even more interesting. With this great change the name of our illustrious countryman, Darwin, is intimately associated, and the year 1859 will always be memorable in science as having produced his great work on "The Origin of Species." In the previous year he and Wallace had published short papers, in which they clearly state the theory of natural selection, at which they had simultaneously and independently arrived. We cannot wonder that Darwin's views should have at first excited great opposition. Nevertheless from the first they met with powerful support, especially in this country, from Hooker, Huxley, and Herbert Spencer. The theory is based on four axioms: —

"1. That no two animals or plants in nature are identical in all respects.

"2. That the offspring tend to inherit the peculiarities of their parents.

"3. That of those which come into existence, only a small number reach maturity.

"4. That those, which are, on the whole, best adapted to the circumstances in which they are placed, are most likely to leave descendants."

Darwin commenced his work by discussing the causes and extent of variability in animals, and the origin of domestic varieties; he showed the impossibility of distinguishing between varieties and species, and pointed out the wide differences which man has produced in some cases — as, for instance, in our domestic pigeons, all unquestionably descended from a common stock. He dwelt on the struggle for existence (which has since become a household word), and which, inevitably resulting in the survival of the fittest, tends gradually to adapt any race of animals to the conditions in which it occurs.

While thus, however, showing the great importance of natural selection, he attributed to it no exclusive influence, but fully admitted that other causes — the use and disuse of organs, sexual selection, etc. — had to be taken into consideration. Passing on to the difficulties of his theory he accounted for the absence of intermediate varieties between species, to a great extent, by the imperfection of the geological record.

But if the geological record be imperfect, it is still very instructive. The further palæontology has progressed the more it has tended to fill up the gaps between existing groups and species, while the careful study of living forms has brought into prominence the variations dependent on food, climate, habitat, and other conditions, and shown that many species long supposed to be absolutely distinct are so closely linked together by intermediate forms that it is difficult to draw a satisfactory line between them.

The principles of classification point also in the same direction, and are based more and more on the theory of descent. Biologists endeavor to arrange animals on what is called the "natural system." No one now places whales among fish, bats among birds, or shrews with mice, notwithstanding their external similarity; and Darwin maintained that "community of descent was the hidden bond which naturalists had been unconsciously seek-

ing." How else, indeed, can we explain the fact that the framework of bones is so similar in the arm of a man, the wing of a bat, the fore-leg of a horse, and the fin of a porpoise — that the neck of a giraffe, and that of an elephant contain the same number of vertebræ?

Strong evidence is, moreover, afforded by embryology; by the presence of rudimentary organs and transient characters, as, for instance, the existence in the calf of certain teeth which never cut the gums, the shrivelled and useless wings of some beetles, the presence of a series of arteries in the embryos of the higher vertebrata exactly similar to those which supply the gills in fishes, even the spots on the young blackbird, the stripes on the lion's cub; these, and innumerable other facts of the same character, appear to be incompatible with the idea that each species was specially and independently created; and to prove, on the contrary, that the embryonic stages of species show us more or less clearly the structure of their ancestors.

Darwin's views, however, are still much misunderstood. I believe there are thousands who consider that according to his theory a sheep might turn into a cow, or a zebra into a horse. No one would more confidently withstand any such hypothesis, his view being, of course, not that the one could be changed into the other, but that both are descended from a common ancestor.

No one, at any rate, will question the immense impulse which Darwin has given to the study of natural history, the number of new views he has opened up, and the additional interest which he has aroused in, and contributed to, biology. When we were young we knew that the leopard had spots, the tiger was striped, and the lion tawny; but why this was so it did not occur to us to ask; and if we had asked no one would have answered. Now we see at a glance that the stripes of the tiger have reference to its life among jungle grasses; the lion is sandy, like the desert; while the markings of the leopard resemble spots of sunshine glancing through the leaves.

The science of embryology may almost be said to have been created in the last half-century. Fifty years ago it was a very general opinion that animals which are unlike when mature, were dissimilar from the beginning. It is to Von Baer, the discoverer of the mammalian ovum, that we owe the great generalization that the development of the egg is in the main a progress from the general to the special, in fact, that embryology is the key to the laws of animal development.

Thus the young of existing species resemble in many cases the mature forms which flourished in ancient times. Huxley has traced up the genealogy of the horse to the miocene anchitherium. In the same way Gaudry has called attention to the fact that just as the individual stag gradually acquires more and more complex antlers, having at first only a single prong, in the next year two points, in the following three, and so on, so the genus, as a whole, in middle miocene times, had two pronged horns; in the upper miocene, three; and that it is not till the upper pliocene that we find any species with the magnificent antlers of our modern deer. It seems to be now generally admitted that birds have come down to us through the dinosaurians, and, as Huxley has shown, the profound break once supposed to exist between birds and reptiles has been bridged over by the discovery of reptilian birds and bird-like reptiles; so that, in fact, birds are modified reptiles. Again, the remarkable genus *Peripatus*, so well studied by Moseley, tends to connect the annulose and articulate types.

Again, the structural resemblances between *Amphioxus* and the ascidians had been pointed out by Goodsir; and Kowalevsky in 1866 showed that these were not mere analogies, but indicated a real affinity. These observations, in the words of Allen Thomson, "have produced a change little short of revolutionary in embryological and zoological views, leading as they do to the support of the hypothesis that the ascidian is an earlier stage in the phylogenetic history of the mammal and other vertebrates."

The larval forms which occur in so many groups, and of which the insects

afford us the most familiar examples, are, in the words of Quatrefages, embryos, which lead an independent life. In such cases as these external conditions act upon the larvæ as they do upon the mature form; hence we have two classes of changes, adaptational or adaptive, and developmental. These and many other facts must be taken into consideration; nevertheless naturalists are now generally agreed that embryological characters are of high value as guides in classification, and it may, I think, be regarded as well established that, just as the contents and sequence of rocks teach us the past history of the earth, so is the gradual development of the species indicated by the structure of the embryo and its developmental changes.

When the supporters of Darwin are told that his theory is incredible, they may fairly ask why it is impossible that a species in the course of hundreds of thousands of years should have passed through changes which occupy only a few days or weeks in the life history of each individual?

The phenomena of yolk-segmentation, first observed by Prevost and Dumas, are now known to be in some form or other invariably the precursors of embryonic development; while they reproduce, as the first stages in the formation of the higher animals, the main and essential features in the life history of the lowest forms. The "blastoderm" as it is called, or first germ of the embryo in the egg, divides itself into two layers, corresponding, as Huxley has shown, to the two layers into which the body of the cœlenterata may be divided. Not only so, but most embryos at an early stage of development have the form of a cup, the walls of which are formed by the two layers of the blastoderm. Kowalevsky was the first to show the prevalence of this embryonic form, and subsequently Lankester and Hæckel put forward the hypothesis that it was the embryonic repetition of an ancestral type, from which all the higher forms are descended. The cavity of the cup is supposed to be the stomach of this simple organism, and the opening of the cup the mouth. The inner layer of the wall of the cup constitutes the digestive membrane, and the outer the skin. To this form Hæckel gave the name gastræa. It is perhaps doubtful whether the theory of Lankester and Hæckel can be accepted in precisely the form they propounded it; but it has had an important influence on the progress of embryology. I cannot quit the science of embryology without alluding to the very admirable work on "Comparative Embryology" by our new general secretary, Mr. Balfour, and also the "Elements of Embryology" which he had previously published in conjunction with Dr. M. Foster.

In 1842, Steenstrup published his celebrated work on the "Alternation of Generations," in which he showed that many species are represented by two perfectly distinct types or broods, differing in form, structure, and habits; that in one of them males are entirely wanting, and that the reproduction is effected by fission, or by buds, which, however, are in some cases structurally indistinguishable from eggs. Steenstrup's illustrations were mainly taken from marine or parasitic species, of very great interest, but not generally familiar, excepting to naturalists. It has since been shown that the common *Cynips* or gallfly is also a case in point. It had long been known that in some genera belonging to this group, males are entirely wanting, and it has now been shown by Bassett, and more thoroughly by Adler, that some of these species are double-brooded; the two broods having been considered as distinct genera.

Thus an insect known as *Neuroterus lenticularis*, of which females only occur, produces the familiar oak-spangles so common on the under sides of oak-leaves, from which emerge, not *Neuroterus lenticularis*, but an insect hitherto considered as a distinct species, belonging even to a different genus, *Spathegaster baccarum*. In *Spathegaster* both sexes occur; they produce the currant-like galls found on oaks, and from these galls *Neuroterus* is again developed. So also the King Charles oak-apples produces a species known as *Teras terminalis*, which descends to the ground, and makes small galls on the roots of the oak. From these emerge an insect known as *Biorhiza aptera*, which again gives rise to the common oak-apple.

It might seem that such inquiries as these could hardly have any practical bearing. Yet it is not improbable that they may lead to very important results. For instance, it would appear that the fluke which produces the rot in sheep, passes one phase of its existence in the black slug, and we are not without hopes that the researches, in which our lamented friend Prof. Rolleston was engaged at the time of his death, which we all so much deplore, will lead, if not to the extirpation, at any rate to the diminution, of a

pest from which our farmers have so grievously suffered.

It was in the year 1839 that Schwann and Schleiden demonstrated the intimate relation in which animals and plants stand to each other, by showing the identity of the laws of development of the elementary parts in the two kingdoms of organic nature.

As regards descriptive biology, by far the greater number of species now recorded have been named and described within the last half-century.

Dr. Gunther has been good enough to make a calculation for me. The numbers, of course, are only approximate, but it appears that while the total number of animals described up to 1831 was not more than seventy thousand, the number now is at least three hundred and twenty thousand.

Lastly, to show how large a field still remains for exploration, I may add that Mr. Waterhouse estimates that the British Museum alone contains not fewer than twelve thousand species of insects which have not yet been described, while our collections do not probably contain anything like one-half of those actually in existence. Further than this, the anatomy and habits even of those which have been described offer an inexhaustible field for research, and it is not going too far to say that there is not a single species which would not amply repay the devotion of a lifetime.

One remarkable feature in the modern progress of biological science has been the application of improved methods of observation and experiment; and the employment in physiological research of the exact measurements employed by the experimental physicist. Our microscopes have been greatly improved. The use of chemical re-agents in microscopical investigations has proved most instructive, and another very important method of investigation has been the power of obtaining very thin slices by imbedding the object to be examined in paraffin or some other soft substance. In this manner we can now obtain, say, fifty separate sections of the egg of a beetle, or the brain of a bee.

At the close of the last century, Sprengel published a most suggestive work on flowers, in which he pointed out the curious relation existing between these and insects, and showed that the latter carry the pollen from flower to flower. His observations, however, attracted little notice until Darwin called attention to the subject in 1862. It had long been known that the cowslip and primrose exist under two forms, about equally numerous, and differing from one another in the arrangements of their stamens and pistils; the one form having the stamens on the summit of the flower and the stigma half-way down; while in the other the relative positions are reversed, the stigma being at the summit of the tube and the stamens half-way down. This difference had, however, been regarded as a case of mere variability; but Darwin showed it to be a beautiful provision, the result of which is that insects fertilize each flower with pollen brought from a different plant; and he proved that flowers fertilized with pollen from the other form yield more seed than if fertilized with pollen of the same form, even if taken from a different plant.

Attention having been thus directed to the question, an astonishing variety of most beautiful contrivances have been observed and described by many botanists, especially Hooker, Axel, Delpino, Hildebrand, Bennett, Fritz Müller, and above all Hermann Müller and Darwin himself. The general result is that to insects, and especially to bees, we owe the beauty of our gardens, the sweetness of our fields. To their beneficent, though unconscious action, flowers owe their scent and color, their honey — nay, in many cases, even their form. Their present shape and varied arrangements, their brilliant colors, their honey, and their sweet scent are all due to the selection exercised by insects.

In these cases the relation between plants and insects is one of mutual advantage. In many species, however, plants present us with complex arrangements adapted to protect them from insects; such, for instance, are in many cases the resinous glands which render leaves unpalatable; the thickets of hairs and other precautions which prevent flowers from being robbed of their honey by ants. Again, more than a century ago, our countryman, Ellis, described an American plant, *Dionæa*, in which the leaves are somewhat concave, with long lateral spines and a joint in the middle; close up with a jerk, like a rat-trap, the moment any unwary insect alights on them. The plant, in fact, actually captures and devours insects. This observation also remained as an isolated fact until within the last few years, when Darwin, Hooker, and others have shown that many other species have curious and very varied contrivances for supplying themselves with animal food.

Some of the most fascinating branches of botany — morphology, histology, and physiology — scarcely existed before 1830. In the two former branches the discoveries of Von Mohl are pre-eminent. He first observed cell-division in 1835, and detected the presence of starch in chlorophyll corpuscles in 1837, while he first described protoplasm, now so familiar to us, at least by name, in 1846. In the same year Amici discovered the existence of the embryonic vesicle in the embryo sac, which develops into the embryo when fertilized by the entrance of the pollen-tube into the micropyle. The existence of sexual reproduction in the lower plants was doubtful, or at least doubted by some eminent authorities, as recently as 1853, when the actual process of fertilization in the common bladderwrack of our shores was observed by Thuret, while the reproduction of the larger fungi was first worked out by De Bary in 1863.

As regards lichens, Schwendener proposed, in 1869, the startling theory, now however accepted by some of the highest authorities, that lichens are not autonomous organisms, but commensal associations of a fungus parasitic on an alga. With reference to the higher cryptogams it is hardly too much to say that the whole of our exact knowledge of their life-history has been obtained during the last half-century. Thus in the case of ferns the male organs, or antheridia, were first discovered by Nägeli in 1844, and the archegonia, or female organs, by Suminski in 1848. The early stages in the development of mosses were worked out by Valentine in 1833. Lastly, the principle of alternation of generations in plants was discovered by Hofmeister. This eminent naturalist also, in 1851–4, pointed out the homologies of the reproductive processes in mosses, vascular cryptogams, gymnosperms, and angiosperms.

Nothing could have appeared less likely than that researches into the theory of spontaneous generation should have led to practical improvements in medical science. Yet such has been the case. Only a few years ago bacteria seemed mere scientific curiosities. It had long been known that an infusion — say, of hay — would, if exposed to the atmosphere, be found, after a certain time, to teem with living forms. Even those few who still believe that life would be spontaneously generated in such an infusion, will admit that these minute organisms are, if not entirely, yet mainly, derived from germs floating in our atmosphere; and if precautions are taken to exclude such germs, as in the careful experiments especially of Pasteur, Tyndall, and Roberts, every one will grant that in ninety-nine cases out of a hundred no such development of life will take place.

These facts have led to most important results in surgery. One reason why compound fractures are so dangerous, is because, the skin being broken, the air obtains access to the wound, bringing with it innumerable germs, which too often set up putrefying action. Lister first made a practical application of these observations. He set himself to find some substance capable of killing the germs, without being itself too potent a caustic, and he found that dilute carbolic acid fulfilled these conditions. This discovery has enabled many operations to be performed which would previously have been almost hopeless.

The same idea seems destined to prove as useful in medicine as in surgery. There is great reason to suppose that many diseases, especially those of a zymotic character, have their origin in the germs of special organisms. We know that fevers run a certain definite course. The parasitic organisms are at first few, but gradually multiply at the expense of the patient, and then die out again. Indeed, it seems to be thoroughly established that many diseases are due to the excessive multiplication of microscopic organisms, and we are not without hope that means will be discovered by which, without injury to the patient, these terrible, though minute, enemies may be destroyed, and the disease thus stayed. The interesting researches of Burdon Sanderson, Greenfield, Koch, Pasteur, Toussaint, and others, seem to justify the hope that we may be able to modify these and other germs, and then by appropriate inoculation to protect ourselves against fever and other acute diserses.

The history of anæsthetics is a most remarkable illustration of how long we may be on the very verge of a most important discovery. Ether, which, as we all know, produces perfect insensibility to pain, was discovered as long ago as 1540. The anæsthetic property of nitrous oxide, now so extensively used, was observed in 1800 by Sir H. Davy, who actually experimented on himself, and had one of his teeth painlessly extracted when under its influence. He even suggests that "as nitrous oxide gas seems capable of destroying pain, it could probably be used with advantage in surgical operations."

Nay, this property of nitrous oxide was habitually explained and illustrated in the chemical lectures given in hospitals, and yet for fifty years the gas was never used in actual operations.

Few branches of science have made more rapid progress in the last half-century than that which deals with the ancient condition of man. When our Association was founded it was generally considered that the human race suddenly appeared on the scene, about six thousand years ago, after the disappearance of the extinct mammalia, and when Europe, both as regards physical conditions and the other animals by which it was inhabited, was pretty much in the same condition as in the period covered by Greek and Roman history. Since then the persevering researches of Layard, Rawlinson, Botta and others have made known to us, not only the statues and palaces of the ancient Assyrian monarchs, but even their libraries; the cuneiform characters have been deciphered, and we can not only see, but read in the British Museum, the actual contemporary records, on burnt clay cylinders, of the events recorded in the historical books of the Old Testament and in the pages of Herodotus. The researches in Egypt also seem to have satisfactorily established the fact that the pyramids themselves are at least six thousand years old, while it is obvious that the Assyrian and Egyptian monarchies cannot suddenly have attained to the wealth and power, the state of social organization, and progress in the arts, of which we have before us, preserved by the sand of the desert from the ravages of man, such wonderful proofs.

In Europe, the writings of the earliest historians and poets indicated that, before iron came into general use, there was a time when bronze was the ordinary material of weapons, axes, and other cutting implements, and though it seemed *a priori* improbable that a compound of copper and tin should have preceded the simple metal iron, nevertheless the researches of archæologists have shown that there really was in Europe a "bronze age," which at the dawn of history was just giving way to that of "iron."

The contents of ancient graves, buried in many cases so that their owner might carry some at least of his wealth with him to the world of spirits, left no room for doubt as to the existence of a bronze age; but we get a completer idea of the condition of man at this period from the Swiss lake-villages, first made known to us by Keller. Along the shallow edges of the Swiss lakes there flourished, once upon a time, many populous villages or towns, built on platforms supported by piles, exactly as many Malayan villages are now. Under these circumstances innumerable objects were one by one dropped into the water; sometimes whole villages were burnt, and their contents submerged; and thus we have been able to recover, from the waters of oblivion in which they had rested for more than two thousand years, not only the arms and tools of this ancient people, the bones of their animals, their pottery and ornaments, but the stuffs they wore, the grain they had stored up for future use, even fruits and cakes of bread.

But this bronze-using people were not the earliest occupants of Europe. The contents of ancient tombs give evidence of a time when metal was unknown. This also was confirmed by the evidence then unexpectedly received from the Swiss lakes. By the side of the bronze-age villages were others, not less extensive, in which, while implements of stone and bone were discovered literally by thousands, not a trace of metal was met with. The shell-mounds or refuse-heaps accumulated by the ancient fishermen along the shores of Denmark, fully confirmed the existence of a "stone age."

No bones of the reindeer, no fragment of any of the extinct mammalia, have been found in any of the Swiss lake-villages or in any of the thousands of tumuli which have been opened in our own country or in central and southern Europe. Yet the contents of caves and of river gravels afford abundant evidence that there was a time when the mammoth and rhinoceros, the musk-ox and reindeer, the cave lion and hyena, the great bear and the gigantic Irish elk wandered in our woods and valleys, and the hippopotamus floated in our rivers; when England and France were united, and the Thames and the Rhine had a common estuary. This was long supposed to be before the advent of man. At length, however, the discoveries of Boucher de Perthes in the valley of the Somme, supported as they are by the researches of many Continental naturalists, and in our own country of MacEnery and Godwin-Austen, Prestwich and Lyell, Vivian and Pengelly, Christy, Evans, and many more, have proved that man formed a humble part of this strange assembly.

Nay, even at this early period there were at least two distinct races of men in

Europe; one of them — as Boyd Dawkins has pointed out — closely resembling the modern Esquimaux in form, in his weapons and implements, probably in his clothing, as well as in so many of the animals with which he was associated.

At this stage man appears to have been ignorant of pottery, to have had no knowledge of agriculture, no domestic animals, except perhaps the dog. His weapons were the axe, the spear, and the javelin; I do not believe he knew the use of the bow, though he was probably acquainted with the lance. He was, of course, ignorant of metal, and his stone implements, though skilfully formed, were of quite different shapes from those of the second stone age, and were never ground. This earlier stone period, when man co-existed with these extinct mammalia, is known as the palæolithic, or early stone age, in opposition to the neolithic, or newer stone age.

The remains of the mammalia which co-existed with man in pre-historic times have been most carefully studied by Owen, Lartet, Rütimeyer, Falconer, Busk, Boyd Dawkins, and others. The presence of the mammoth, the reindeer, and especially of the musk-ox, indicates a severe, not to say an Arctic, climate, the existence of which, moreover, was proved by other considerations; while, on the contrary, the hippopotamus requires considerable warmth. How then is this association to be explained?

While the climate of the globe is, no doubt, much affected by geographical conditions, the cold of the glacial period was, I believe, mainly due to the eccentricity of the earth's orbit, combined with the obliquity of the ecliptic. The result of the latter condition is a period of twenty one thousand years, during one-half of which the northern hemisphere is warmer than the southern, while during the other ten thousand five hundred years the reverse is the case. At present we are in the former phase, and there is, we know, a vast accumulation of ice at the south pole. But when the earth's orbit is nearly circular, as it is at present, the difference between the two hemispheres is not very great; on the contrary, as the eccentricity of the orbit increases the contrast between them increases also. This eccentricity is continually oscillating within certain limits, which Croll and subsequently Stone have calculated out for the last million years. At present the eccentricity is ·016, and the mean temperature of the coldest month in London is about 40°. Such has been the state of things for nearly one hundred thousand years; but before that there was a period, beginning three hundred thousand years ago, when the eccentricity of the orbit varied from ·26 to ·57. The result of this would be greatly to increase the effect due to the obliquity of the orbit; at certain periods the climate would be much warmer than at present, while at others the number of days in winter would be twenty more, and of summer twenty less than now, while the mean temperature of the coldest month would be lowered 20°. We thus get something like a date for the last glacial epoch, and we see that it was not simply a period of cold, but rather one of extremes, each beat of the pendulum of temperature lasting for no less than twenty-one thousand years. This explains the fact that, as Morlot showed in 1854, the glacial deposits of Switzerland, and, as we now know, those of Scotland, are not a single uniform layer, but a succession of strata indicating very different conditions. I agree also with Croll and Geikie in thinking that these considerations explain the apparent anomaly of the co-existence in the same gravels of Arctic and tropical animals; the former having lived in the cold, while the latter flourished in the hot, periods.

It is, I think, now well established that man inhabited Europe during the milder periods of the glacial epoch. Some high authorities indeed consider that we have evidence of his presence in pre-glacial and even in miocene times, but I confess that I am not satisfied on this point. Even the more recent period carries back the record of man's existence to a distance so great as altogether to change our views of ancient history.

Nor is it only as regards the antiquity and material condition of man in prehistoric times that great progress has been made. If time permitted I should have been glad to have dwelt on the origin and development of language, of custom, and of law. On all of these the comparison of the various lower races still inhabiting so large a portion of the earth's surface, has thrown much light; while even in the most cultivated nations we find survivals, curious fancies, and lingering ideas; the fossil remains as it were of former customs and religions embedded in our modern civilization, like the relics of extinct animals in the crust of the earth.

In geology the formation of our Association coincided with the appearance of Lyell's "Principles of Geology," the first

volume of which was published in 1830, and the second in 1832. At that time the received opinion was that the phenomena of geology could only be explained by violent periodical convulsions, and a high intensity of terrestrial energy culminating in repeated catastrophes. Hutton and Playfair had indeed maintained that such causes as those now in operation would, if only time enough were allowed, account for the geological structure of the earth; nevertheless the opposite view generally prevailed, until Lyell, with rare sagacity and great eloquence, with a wealth of illustration and most powerful reasoning, convinced geologists that the forces now in action are powerful enough, if only time be given, to produce results quite as stupendous as those which science records.

As regards stratigraphical geology, at the time of the first meeting of the British Association at York, the strata between the carboniferous limestone and the chalk had been mainly reduced to order and classified, chiefly through the labors of William Smith. But the classification of all the strata lying above the chalk and below the carboniferous limestone respectively, remained in a state of the greatest confusion. The year 1831 marks the period of the commencement of the joint labors of Sedgwick and Murchison, which resulted in the establishment of the Cambrian, Silurian, and Devonian systems. Our pre-Cambrian strata have recently been divided by Hicks into four great groups of immense thickness, and implying, therefore, a great lapse of time; but no fossils have yet been discovered in them. Lyell's classification of the tertiary deposits, the result of the studies which he carried on with the assistance of Deshayes and others, was published in the third volume of the "Principles of Geology" in 1833. The establishment of Lyell's divisions of eocene, miocene, and pliocene, was the starting-point of a most important series of investigations by Prestwich and others of these younger deposits; as well as of the post-tertiary, quaternary, or drift beds, which are of special interest from the light they have thrown on the early history of man.

As regards the physical character of the earth, two theories have been held: one, that of a fluid interior covered by a thin crust; the other, of a practically solid sphere. The former is now very generally admitted, both by astronomers and geologists, to be untenable. The prevailing feeling of geologists on this subject has been well expressed by Prof. Le Conte, who says, "The whole theory of igneous agencies — which is little less than the whole foundation of theoretic geology — must be reconstructed on the basis of a solid earth."

In 1837 Agassiz startled the scientific world by his "*Discours sur l'ancienne extension des Glaciers*," in which, developing the observation already made by Charpentier and Venetz, that boulders had been transported to great distances, and that rocks far away from, or high above, existing glaciers, are polished and scratched by the action of ice, he boldly asserted the existence of a "glacial period," during which Switzerland and the north of Europe were subjected to great cold and buried under a vast sheet of ice.

The ancient poets described certain gifted mortals as privileged to descend into the interior of the earth, and have exercised their imagination in recounting the wonders there revealed. As in other cases, however, the realities of science have proved more varied and surprising than the dreams of fiction. Of the gigantic and extraordinary animals thus revealed to us by far the greatest number have been described during the period now under review. For instance, the gigantic cetiosaurus was described by Owen in 1838, the dinornis of New Zealand by the same distinguished naturalist in 1839, the mylodon in the same year, and the archæopteryx in 1862.

In America, a large number of remarkable forms have been described, mainly by Marsh, Leidy, and Cope. Marsh has made known to us the titanosaurus, of the American (Colorado) Jurassic beds, which is, perhaps, the largest land animal yet known, being a hundred feet in length, and at least thirty in height, though it seems possible that even these vast dimensions were exceeded by those of the atlantosaurus. Nor must I omit the hesperornis, described by Marsh in 1872, as a carnivorous, swimming ostrich, provided with teeth, which he regards as a character inherited from reptilian ancestors; the ichthyornis, stranger still, with biconcave vertebræ, like those of fishes, and teeth set in sockets.

As giving, in a few words, an idea of the rapid progress in this department, I may mention that Morris's "Catalogue of British Fossils," published in 1843, contained fifty-three hundred species; while that now in preparation by Mr. Etheridge enumerates fifteen thousand.

But if these figures show how rapid our recent progress has been, they also very forcibly illustrate the imperfection of the geological record, and give us, I will not say a measure, but an idea, of the imperfection of the geological record. The number of all the described recent species is over three hundred thousand, but certainly not half are yet on our lists, and we may safely take the total number of recent species as being not less than seven hundred thousand. But in former times there have been at the very least twelve periods, in each of which by far the greater number of species were distinct. True, the number of species was probably not so large in the earlier periods as at present; but if we make a liberal allowance for this, we shall have a total of more than two million species, of which about twenty-five thousand only are as yet upon record; and many of these are only represented by a few, some only by a single specimen, or even only by a fragment.

The progress of palæontology may also be marked by the extent to which the existence of groups has been, if I may so say, carried back in time. Thus I believe that in 1830 the earliest known quadrupeds were small marsupials belonging to the Stonesfield slates; the most ancient mammal now known is *Microlestes antiquus* from the Keuper of Würtemberg. The oldest bird known in 1831 belonged to the period of the London clay; the oldest now known is the archæopteryx of the Solenhofen slates, though it is probable that some at any rate of the footsteps on the triassic rocks are those of birds. So again the amphibia have been carried back from the trias to the coal-measures; fish from the old red sandstone to the upper Silurian; reptiles to the trias; insects from the cretaceous to the Devonian; mollusca and crustacea from the Silurian to the lower Cambrian. The rocks below the Cambrian, though of immense thickness, have afforded no relics of animal life, if we except the problematical *Eozoon Canadense*, so ably studied by Dawson and Carpenter. But if palæontology as yet throws no light on the original forms of life, we must remember that the simplest and the lowest organisms are so soft and perishable that they would leave "not a wrack behind."

Passing to the science of geography, Mr. Clements Markham has recently published an excellent summary of what has been accomplished during the half-century.

But the progress in our knowledge of geography is, and has been, by no means confined to the improvement of our maps, or to the discovery and description of new regions of the earth, but has extended to the causes which have led to the present configuration of the surface. To a great extent indeed this part of the subject falls rather within the scope of geology, but I may here refer, in illustration, to the distribution of lakes, the phenomena of glaciers, the formation of volcanic mountains, and the structure and distribution of coral islands.

The origin and distribution of lakes is one of the most interesting problems in physical geography. That they are not scattered at random, a glance at the map is sufficient to show. They abound in mountain districts, are comparatively rare in equatorial regions, increasing in number as we go north, so that in Scotland and the northern parts of America they are sown broadcast.

Perhaps *a priori* the first explanation of the origin of lakes which would suggest itself, would be that they were formed in hollows resulting from a disturbance of the strata, which had thrown them into a basin-shaped form. Lake-basins, however, of this character are, as a matter of fact, very rare; as a general rule lakes have not the form of basin-shaped, synclinal hollows, but, on the contrary, the strike of the strata often runs right across them. My eminent predecessor, Prof. Ramsay, divides lakes into three classes: (1) those which are due to irregular accumulations of drift, and which are generally quite shallow; (2) those which are formed by moraines; and (3) those which occupy true basins scooped by glacier ice out of the solid rock. To the latter class belong most of the great Swiss and Italian lakes. Prof. Ramsay attributes their excavation to glaciers, because it is of course obvious that rivers cannot make basin-shaped hollows surrounded by rock on all sides. Now the Lake of Geneva, twelve hundred and thirty feet above the sea, is nine hundred and eighty-four feet deep, the Lake of Brienz is eighteen hundred and fifty feet above the sea, and two thousand feet deep, so that its bottom is really below the sea-level. The Italian lakes are even more remarkable. The Lake of Como, seven hundred feet above the sea, is nineteen hundred and twenty-nine feet deep. Lago Maggiore, six hundred and eighty-five feet above the sea, is no less than twenty-six hundred and twenty-five feet

deep. It will be observed that these lakes, like many others in mountain regions, those of Scandinavia, for instance, lie in the direct channels of the great old glaciers. If the mind is at first staggered at the magnitude of the scale, we must remember that the ice which scooped out the valley in which the Lake of Geneva now reposes, was once at least twenty-seven hundred feet thick; while the moraines were also of gigantic magnitude, that of Ivrea, for instance, being no less than fifteen hundred feet in height. Prof. Ramsay's theory seems, therefore, to account beautifully for a large number of interesting facts.

Passing from lakes to mountains, two rival theories with reference to the structure and origin of volcanoes long struggled for supremacy.

The more general view was that the sheets of lava and scoriæ which form volcanic cones — such, for instance, as Ætna or Vesuvius — were originally nearly horizontal, and that subsequently a force operating from below, and exerting a pressure both upwards and outwards from a central axis towards all points of the compass, uplifted the whole stratified mass and made it assume a conical form, giving rise at the same time, in many cases, to a wide and deep circular opening at the top of the cone, called by the advocates of this hypothesis a "crater of elevation."

This theory, though, as it seems to us now, it had already received its death-blow from the admirable memoirs of Scrope, was yet that most generally adopted fifty years ago, because it was considered that compact and crystalline lavas could not have consolidated on a slope exceeding 1° or 2°. In 1858, however, Sir C. Lyell conclusively showed that in fact such lavas could consolidate at a considerable angle, even in some cases at more than 30°, and it is now generally admitted that though the beds of lava, etc., may have sustained a slight angular elevation since their deposition, still in the main, volcanic cones have acquired their form by the accumulation of lava and ashes ejected from one or more craters.

The problems presented by glaciers are of very great interest. In 1843 Agassiz and Forbes proved that the centre of a glacier, like that of a river, moves more rapidly than its sides. But how and why do glaciers move at all? Rendu, afterwards Bishop of Annecy, in 1841 endeavored to explain the facts by supposing that glacier ice enjoys a kind of ductility. The "viscous theory" of glaciers was also adopted, and most ably advocated, by Forbes, who compared the condition of a glacier to that of the contents of a tar-barrel poured into a sloping channel. We have all, however, seen long narrow fissures, a mere fraction of an inch in width, stretching far across glaciers — a condition incompatible with the ordinary idea of viscosity. The phenomenon of relegation was afterwards applied to the explanation of glacier motion. An observation of Faraday's supplied the clue. He noticed in 1850 that when two pieces of thawing ice are placed together they unite by freezing at the place of contact. Following up this suggestion, Tyndall found that if he compressed a block of ice in a mould it could be made to assume any shape he pleased. A straight prism, for instance, placed in a groove and submitted to hydraulic pressure, was bent into a transparent semicircle of ice. These experiments seem to have proved that a glacial valley is a mould through which the ice is forced, and to which it will accommodate itself, while as Tyndall and Huxley also pointed out, the "veined structure of ice" is produced by pressure, in the same manner as the cleavage of slate rocks.

It was in the year 1842 that Darwin published his great work on "Coral Islands." The fringing reefs of coral presented no special difficulty. They could be obviously accounted for by an elevation of the land, so that the coral which had originally grown under water, had been raised above the sea-level. The circular or oval shape of so many reefs, however, each having a lagoon in the centre, closely surrounded by a deep ocean, and rising but a few feet above the sea-level, had long been a puzzle to the physical geographer. The favorite theory was that these were the summits of submarine volcanoes on which the coral had grown. But as the reef-making coral does not live at greater depths than about twenty-five fathoms, the immense number of these reefs formed an almost insuperable objection to this theory. The Laccadives and Maldives, for instance — meaning literally the "lac of islands" and the "thousand islands" — are a series of such atolls, and it was impossible to imagine so great a number of craters, all so nearly of the same altitude. Darwin showed, moreover, that so far from the ring of corals resting on a corresponding ridge of rock, the lagoons, on the contrary, now occupy

the place which was once the highest land. He pointed out that some lagoons, as, for instance, that of Vanikoro, contain an island in the middle; while other islands, such as Tahiti, are surrounded by a margin of smooth water, separated from the ocean by a coral reef. Now, if we suppose that Tahiti were to sink slowly, it would gradually approximate to the condition of Vanikoro; and if Vanikoro gradually sank, the central island would disappear, while on the contrary the growth of the coral might neutralize the subsidence of the reef, so that we should have simply an atoll, with its lagoon. The same considerations explain the origin of the "barrier reefs," such as that which runs, for nearly one thousand miles, along the north-east coast of Australia. Thus Darwin's theory explained the form and the approximate identity of altitude of these coral islands. But it did more than this, because it showed us that there were great areas in process of subsidence, which, though slow, was of great importance in physical geography.*

Much information has also been acquired with reference to the abysses of the ocean, especially from the voyages of the "Porcupine" and the "Challenger." The greatest depth yet recorded is near the Ladrone Islands, where a sounding of 4,575 fathoms was obtained.

Ehrenberg long ago pointed out the similarity of the calcareous mud now accumulating in our recent seas to the chalk, and showed that the green sands of the geologist are largely made up of casts of foraminifera. Clay, however, had been looked on, until the recent expeditions, as essentially a product of the disintegration of older rocks. Not only, however, are a large proportion of siliceous and calcareous rocks either directly or indirectly derived from material which has once formed a portion of living organisms, but Sir Wyville Thomson maintains that this is the case with some clays also. In that case the striking remark of Linnæus, that "fossils are not the children but the parents of rocks," will have received remarkable confirmation. I should have thought it, I confess, probable that these clays are, to a considerable extent, composed of volcanic dust.

It would appear that calcareous deposits resembling our chalk do not occur at a greater depth than three thousand fathoms; they have not been met with in the abysses of the ocean. Here the bottom consists of exceedingly fine clay, sometimes colored red by oxide of iron, sometimes chocolate by manganese oxide, and containing with foraminifera occasionally large numbers of siliceous radiolaria. These strata seem to accumulate with extreme slowness: this is inferred from the comparative abundance of whales' bones and fishes' teeth; and from the presence of minute spherical particles, supposed by Mr. Murray to be of cosmic origin — in fact, to be the dust of meteorites, which in the course of ages have fallen on the ocean. Such particles no doubt occur over the whole surface of the earth, but on land they soon oxidize, and in shallow water they are covered up by other deposits. Another interesting result of recent deep-sea explorations has been to show that the depths of the ocean are no mere barren solitudes, as was until recent years confidently believed, but, on the contrary, present us many remarkable forms of life. We have, however, as yet but thrown here and there a ray of light down into the ocean abysses.

> Nor can so short a time sufficient be,
> To fathom the vast depths of Nature's sea.

In astronomy, the discovery in 1845 of the planet Neptune, made independently and almost simultaneously by Adams and by Le Verrier, was certainly one of the very greatest triumphs of mathematical genius. Of the minor planets four only were known in 1831, whilst the number now on the roll amounts to two hundred and twenty. Many astronomers believe in the existence of an intra-Mercurial planet or planets, but this is still an open question. The solar system has also been enriched by the discovery of an inner ring to Saturn, of satellites to Mars, and of additional satellites to Saturn, Uranus, and Neptune.

The most unexpected progress, however, in our astronomical knowledge during the past half-century has been due to spectrum analysis.

The dark lines in the spectrum were first seen by Wollaston, who noticed a few of them; but they were independently discovered by Fraunhofer, after whom they are justly named, and who, in 1814, mapped no fewer than five hundred and seventy-six. The first steps in "spectrum analysis," properly so called, were made by Sir J. Herschel, Fox Talbot, and by Wheatstone, in a paper read before this Association in 1835. The latter showed that the spectrum emitted by the

* I ought to mention that Darwin's views have recently been questioned by Semper and Murray.

incandescent vapor of metals was formed of bright lines, and that these lines, while, as he then supposed, constant for each metal, differed for different metals. "We have here," he said, "a mode of discriminating metallic bodies more readily than that of chemical examination, and which may hereafter be employed for useful purposes." Nay, not only can bodies thus be more readily discriminated, but, as we now know, the presence of extremely minute portions can be detected, the five-millionth of a grain being in some cases easily perceptible.

It is also easy to see that the presence of any new, simple substance might be detected, and in this manner already several new elements have been discovered, as I shall mention when we come to chemistry.

But spectrum analysis has led to even grander and more unexpected triumphs. Fraunhofer himself noticed the coincidence between the double dark line D of the solar spectrum and a double line which he observed in the spectra of ordinary flames, while Stokes pointed out to Sir W. Thomson, who taught it in his lectures, that in both cases these lines were due to the presence of sodium. To Kirchhoff and Bunsen, however, is due the independent conception and the credit of having first systematically investigated the relation which exists between Fraunhofer's lines and the bright lines in the spectra of incandescent metals. In order to get some fixed measure by which they might determine and record the lines characterizing any given substance, it occurred to them that they might use for comparison the spectrum of the sun. They accordingly arranged their spectroscope so that one-half of the slit was lighted by the sun, and the other by the luminous gases they proposed to examine. It immediately struck them that the bright lines in the one corresponded with the dark lines in the other — the bright line of sodium, for instance, with the line or rather lines D in the sun's spectrum. The conclusion was obvious. There was sodium in the sun! It must indeed have been a glorious moment when that thought flashed across them, and even by itself well worth all their labor.

Kirchhoff and Bunsen thus proved the existence in the sun of hydrogen, sodium, magnesium, calcium, iron, nickel, chromium, manganese, titanium, and cobalt; since which Angström, Thalèn, and Lockyer have considerably increased the list.

But it is not merely the chemistry of the heavenly bodies on which light is thrown by the spectroscope; their physical structure and evolutional history are also illuminated by this wonderful instrument of research.

It used to be supposed that the sun was a dark body enveloped in a luminous atmosphere. The reverse now appears to be the truth. The body of the sun, or photosphere, is intensely brilliant; round it lies the solar atmosphere of comparatively cool gases, which cause the dark lines in the spectrum; thirdly, a chromosphere, — a sphere principally of hydrogen, jets of which are said sometimes to reach to a height of one hundred thousand miles or more, into the outer coating or corona, the nature of which is still very doubtful.

Formerly the red flames which represent the higher regions of the chromosphere could be seen only on the rare occasions of a total solar eclipse. Jansen and Lockyer, by the application of the spectroscope, have enabled us to study this region of the sun at all times.

It is, moreover, obvious that the powerful engine of investigation afforded us by the spectroscope is by no means confined to the substances which form part of our system. The incandescent body can thus be examined, no matter how great its distance, so long only as the light is strong enough. That this method was theoretically applicable to the light of the stars was indeed obvious, but the practical difficulties were very great. Sirius, the brightest of all, is, in round numbers, a hundred millions of millions of miles from us; and, though as big as sixty of our suns, his light when it reaches us, after a journey of sixteen years, is at most a two-thousand-millionth part as bright. Nevertheless as long ago as 1815 Fraunhofer recognized the fixed lines in the light of four of the stars, and in 1863 Miller and Huggins in our own country, and Rutherford in America, succeeded in determining the dark lines in the spectrum of some of the brighter stars, thus showing that these beautiful and mysterious lights contain many of the material substances with which we are familiar. In Aldebaran, for instance, we may infer the presence of hydrogen, sodium, magnesium, iron, calcium, tellurium, antimony, bismuth, and mercury; some of which are not yet known to occur in the sun. As might have been expected, the composition of the stars is not uniform, and it would appear that it may be arranged in a few well-marked classes, indi-

cating differences of temperature, or in other words, of age. Some recent photographic spectra of stars obtained by Huggins go very far to justify this view.

Thus we can make the stars teach us their own composition with light which started from its source before we were born — light older than our Association itself.

But spectrum analysis has even more than this to tell us. The old methods of observation could determine the movements of the stars so far only as they were transverse to us; they afforded no means of measuring motion either directly towards or away from us. Now Döppler suggested in 1841 that the colors of the stars would assist us in this respect, because they would be affected by their motion to and from the earth, just as a steam-whistle is raised or lowered as it approaches or recedes from us. Every one has observed that if a train whistles as it passes us, the sound appears to alter at the moment the engine goes by. This arises, of course, not from any change in the whistle itself, but because the number of vibrations which reach the ear in a given time are increased by the speed of the train as it approaches, and diminished as it recedes. So like the sound, the color would be affected by such a movement; but Döppler's method was practically inapplicable, because the amount of effect on the color would be utterly insensible; and even if it were otherwise the method could not be applied, because as we did not know the true color of the stars, we have no datum line by which to measure.

A change of refrangibility of light, however, does occur in consequence of relative motion, and Huggins successfully applied the spectroscope to solve the problem. He took in the first place the spectroscope of Sirius, and chose a line known as F, which is due to hydrogen. Now, if Sirius was motionless, or rather if it retained a constant distance from the earth, the line F would occupy exactly the same position in the spectrum of Sirius, as in that of the sun. On the contrary, if Sirius were approaching or receding from us, this line would be slightly shifted either towards the blue or red end of the spectrum. He found that the line had moved very slightly towards the red, indicating that the distance between us and Sirius is increasing at the rate of about twenty miles a second. So also Betelgeux, Rigel, Castor, and Regulus are increasing their distance; while, on the contrary, that of others, as for instance of Vega, Arcturus, and Pollux, is diminishing. The results obtained by Huggins on about twenty stars have since been confirmed and extended by Mr. Christie, now astronomer-royal in succession to Sir G. Airy, who has long occupied the post with so much honor to himself and advantage to science.

To examine the spectrum of a shooting star would seem even more difficult; yet Alexander Herschel has succeeded in doing so, and finds that their nuclei are incandescent solid bodies; he has recognized the lines of potassium, sodium, lithium, and other substances, and considers that the shooting stars are bodies similar in character and composition to the stony masses which sometimes reach the earth as aërolites.

No element has yet been found in any meteorite, which was not previously known as existing in the earth, but the phenomena which they exhibit indicate that they must have been formed under conditions very different from those which prevail on the earth's surface. I may mention, for instance, the peculiar form of crystallized silica, called by Maskelyne asmanite; and the whole class of meteorites, consisting of iron generally alloyed with nickel, which Daubrée terms holosiderites. The interesting discovery, however, by Nordenskjöld, in 1870, at Ovifak, of a number of blocks of iron alloyed with nickel and cobalt, in connection with basalts containing disseminated iron, has, in the words of Judd, "afforded a very important link, placing the terrestrial and extra-terrestrial rocks in closer relations with one another."

We have as yet no sufficient evidence to justify a conclusion as to whether any substances exist in the heavenly bodies which do not occur in our earth, though there are many lines which cannot yet be satisfactorily referred to any terrestrial element. On the other hand, some substances which occur on our earth have not yet been detected in the sun's atmosphere.

Such discoveries as these seemed, not long ago, entirely beyond our hopes. M. Comte, indeed, in his "*Cours de Philosophie Positive*," as recently as 1842, laid it down as an axiom regarding the heavenly bodies, that "nous concevons la possibilité de déterminer leurs formes, leurs distances, leurs grandeurs et leurs mouvements, tandis que nous ne saurions jamais étudier par aucun moyen leur composition chimique ou leur structure miné-

ralogique." Yet within a few years this supposed impossibillty has been actually accomplished, showing how unsafe it is to limit the possibilities of science.

. It is hardly necessary to point out that, while the spectrum has taught us so much, we have still even more to learn. Why should some substances give few, and others many, lines? Why should the same substance give different lines at different temperatures? What are the relations between the lines and the physical or chemical properties?

We may certainly look for much new knowledge of the hidden actions of atoms and molecules from future researches with the spectroscope. It may even, perhaps, teach us to modify our views of the so-called simple substances. Prout long ago, struck by the remarkable fact that nearly all atomic weights are simple multiples of the atomic weight of hydrogen, suggested that hydrogen must be the primordial substance. Brodie's researches also naturally fell in with the supposition that the so-called simple substances are in reality complex, and that their constituents occur separately in the hottest regions of the solar atmosphere. Lockyer considers that his researches lend great probability to this view. The whole subject is one of intense interest, and we may rejoice that it is occupying the attention, not only of such men as Abney, Dewar, Hartley, Liveing, Roscoe, and Schuster in our own country, but also of many foreign observers.

When geology so greatly extended our ideas of past time, the continued heat of the sun became a question of greater interest than ever. Helmholtz has shown that, while adopting the nebular hypothesis, we need not assume that the nebulous matter was originally incandescent; but that its present high temperature may be, and probably is, mainly due to gravitation between its parts. It follows that the potential energy of the sun is far from exhausted, and that with continued shrinking it will continue to give out light and heat, with little, if any, diminution for several millions of years.

Like the sand of the sea, the stars of heaven have ever been used as effective symbols of number, and the improvements in our methods of observation have added fresh force to our original impressions. We now know that our earth is but a fraction of one out of at least seventy-five million worlds.

But this is not all. In addition to the luminous heavenly bodies, we cannot doubt that there are countless others, invisible to us from their greater distance, smaller size, or feebler light; indeed we know that there are many dark bodies which now emit no light or comparatively little. Thus in the case of Procyon, the existence of an invisible body is proved by the movement of the visible star. Again I may refer to the curious phenomena presented by Algol, a bright star in the head of Medusa. This star shines without change for two days and thirteen hours; then, in three hours and a half, dwindles from a star of the second to one of the fourth magnitude; and then, in another three and a half hours, reassumes its original brilliancy. These changes seem certainly to indicate the presence of an opaque body, which intercepts at regular intervals a part of the light emitted by Algol.

Thus the floor of heaven is not only "thick inlaid with patines of bright gold," but studded also with extinct stars; once probably as brilliant as our own sun, but now dead and cold, as Helmholtz tells us that our sun itself will be, some seventeen millions of years hence.

The general result of astronomical researches has been thus eloquently summed up by Proctor: "The sidereal system is altogether more complicated and more varied in structure than has hitherto been supposed; in the same region of the stellar depths co-exist stars of many orders of real magnitude; all orders of nebulæ, gaseous or stellar, planetary, ring-formed, elliptical, and spiral, exist within the limits of the galaxy; and lastly, the whole system is alive with movements, the laws of which may one day be recognized, though at present they appear too complex to be understood."

We can, I think, scarcely claim the establishment of the undulatory theory of light as falling within the last fifty years; for though Brewster, in his "Report on Optics," published in our first volume, treats the question as open, and expresses himself still unconvinced, he was, I believe, almost alone in his preference for the emission theory. The phenomena of interference, in fact, left hardly any — if any — room for doubt, and the subject was finally set at rest by Foucault's celebrated experiments in 1850. According to the undulatory theory the velocity of light ought to be greater in air than in water, while if the emission theory were correct the reverse would be the case. The velocity of light — one hundred and eighty-six thousand miles in a second —

is, however, so great that, to determine its rate in air, as compared with that in water, might seem almost hopeless. The velocity in air was, nevertheless, determined by Fizeau in 1849, by means of a rapidly revolving wheel. In the following year Foucault, by means of a revolving mirror, demonstrated that the velocity of light is greater in air than in water — thus completing the evidence in favor of the undulatory theory of light.

The idea is now gaining ground, that, as maintained by Clerk-Maxwell, light itself is an electro-magnetic disturbance, the luminiferous ether being the vehicle of both light and electricity.

Wünsch, as long ago as 1792, had clearly shown that the three primary colors were red, green, and violet; but his results attracted little notice, and the general view used to be that there were seven principal colors — red, orange, yellow, green, blue, indigo, and violet; four of which — namely orange, green, indigo, and violet — were considered to arise from mixtures of the other three. Red, yellow, and blue were therefore called the primary colors, and it was supposed that in order to produce white light these three colors must always be present.

Helmholtz, however, again showed, in 1852, that a color to our unaided eyes identical with white, was produced by combining yellow with indigo. At that time yellow was considered to be a simple color, and this, therefore, was regarded as an exception to the general rule, that a combination of three simple colors is required to produce white. Again, it was, and indeed still is, the general impression that a combination of blue and yellow makes green. This, however, is entirely a mistake. Of course we all know that yellow paint and blue paint make green paint; but this results from absorption of light by the semi-transparent solid particles of the pigments, and is not a mere mixture of the colors proceeding unaltered from the yellow and the blue particles: moreover, as can easily be shown by two sheets of colored paper and a piece of window glass, blue and yellow light, when combined, do not give a trace of green, but if pure would produce the effect of white. Green, therefore, is after all not produced by a mixture of blue and yellow. On the other hand Clerk-Maxwell proved in 1860 that yellow could be produced by a mixture of red and green, which put an end to the pretension of yellow to be considered a primary element of color. From these and other considerations it would seem, therefore, that the three primary colors — if such an expression be retained — are red, green, and violet.

The existence of rays beyond the violet, though almost invisible to our eyes, had long been demonstrated by their chemical action. Stokes, however, showed in 1852 that their existence might be proved in another manner, for that there are certain substances which, when excited by them, emit light visible to our eyes. To this phenomenon he gave the name of fluorescence. At the other end of the spectrum Abney has recently succeeded in photographing a large number of lines in the infra-red portion, the existence of which was first proved by Sir William Herschel.

From the rarity, and in many cases the entire absence, of reference to blue, in ancient literature, Geiger — adopting and extending a suggestion first thrown out by Mr. Gladstone — has maintained that, even as recently as the time of Homer, our ancestors were blue-blind. Though for my part I am unable to adopt this view, it is certainly very remarkable that neither the Rig-veda, which consists almost entirely of hymns to heaven, nor the Zendavesta, the Bible of the Parsees or fire-worshippers, nor the Old Testament, nor the Homeric poems, ever allude to the sky as blue.

On the other hand, from the dawn of poetry, the splendors of the morning and evening skies have excited the admiration of mankind. As Ruskin says, in language almost as brilliant as the sky itself, the whole heaven, "from the zenith to the horizon, becomes one molten, mantling sea of color and fire; every black bar turns into massy gold, every ripple and wave into unsullied shadowless crimson, and purple, and scarlet, and colors for which there are no words in language, and no ideas in the mind — things which can only be conceived while they are visible; the intense hollow blue of the upper sky melting through it all, showing here deep, and pure, and lightness; there, modulated by the filmy, formless body of the transparent vapor, till it is lost imperceptibly in its crimson and gold."

But what is the explanation of these gorgeous colors? why is the sky blue? and why are the sunrise and sunset crimson and gold? It may be said that the air is blue, but if so how can the clouds assume their varied tints? Brücke showed that very minute particles suspended in water are blue by reflected light. Tyndall has taught us that the blue of the sky

is due to the reflection of the blue rays by the minute particles floating in the atmosphere. Now if from the white light of the sun the blue rays are thus selected, those which are transmitted will be yellow, orange, and red. Where the distance is short the transmitted light will appear yellowish. But as the sun sinks towards the horizon the atmospheric distance increases, and consequently the number of the scattering particles. They weaken in succession the violet, the indigo, the blue, and even disturb the proportions of green. The transmitted light under such circumstances must pass from yellow through orange to red, and thus, while we at noon are admiring the deep blue of the sky, the same rays, robbed of their blue, are elsewhere lighting up the evening sky with all the glories of sunset.

Another remarkable triumph of the last half-century has been the discovery of photography. At the commencement of the century Wedgwood and Davy observed the effect produced by throwing the images of objects on paper or leather prepared with nitrate of silver, but no means were known by which such images could be fixed. This was first effected by Niepce, but his processes were open to objections which prevented them from coming into general use, and it was not till 1839 that Daguerre invented the process which was justly named after him. Very soon a further improvement was effected by our countryman Talbot. He not only fixed his "Talbotypes" on paper — in itself a great convenience — but, by obtaining a negative, rendered it possible to take off any number of positive or natural, copies from one original picture.

We owe to Wheatstone the conception that the idea of solidity is derived from the combination of two pictures of the same object in slightly different perspective. This he proved in 1833 by drawing two outlines of some geometrical figure or other simple object, as they would appear to either eye respectively, and then placing them so that they might be seen, one by each eye. The "stereoscope," thus produced, has been greatly popularized by photography.

For two thousand years the art of lighting had made little if any progress. Until the close of the last century, for instance, our lighthouses contained mere fires of wood or coal, though the construction had vastly improved. The Eddystone lighthouse, for instance, was built by Smeaton in 1759; but for forty years its light consisted in a row of tallow candles stuck in a hoop. The Argand lamp was the first great improvement, followed by gas, and in 1863 by the electric light.

Just as light was long supposed to be due to the emission of material particles, so heat was regarded as a material, though ethereal, substance, which was added to bodies when their temperature was raised.

Davy's celebrated experiment of melting two pieces of ice by rubbing them against one another in the exhausted receiver of an air-pump had convinced him that the cause of heat was the motion of the invisible particles of bodies, as had been long before suggested by Newton, Boyle, and Hooke. Rumford and Young also advocated the same view. Nevertheless, the general opinion, even until the middle of the present century, was that heat was due to the presence of a subtle fluid known as "caloric," a theory which is now entirely abandoned.

The determination of the mechanical equivalent of heat is mainly due to the researches of Mayer and Joule. Mayer, in 1842, pointed out the mechanical equivalent of heat as a fundamental datum to be determined by experiment. Taking the heat produced by the condensation of air as the equivalent of the work done in compressing the air, he obtained a numerical value of the mechanical equivalent of heat. There was, however, in these experiments, one weak point. The matter operated on did not go through a cycle of changes. He assumed that the production of heat was the only effect of the work done in compressing the air. Joule had the merit of being the first to meet this possible source of error. He ascertained that a weight of one pound would have to fall seven hundred and seventy-two feet in order to raise the temperature of one pound of water by 1° Fahr. Hirn subsequently attacked the problem from the other side, and showed that if all the heat passing through a steam-engine was turned into work, for every degree Fahr. added to the temperature of a pound of water, enough work could be done to raise a weight of one pound to a height of seven hundred and seventy-two feet. The general result is that, though we cannot create energy, we may help ourselves to any extent from the great storehouse of nature. Wind and water, the coal-bed and the forest, afford man an inexhaustible supply of available energy.

It used to be considered that there was an absolute break between the different states of matter. The continuity of the

gaseous, liquid, and solid conditions was first demonstrated by Andrews in 1862.

Oxygen and nitrogen have been liquefied independently and at the same time by Cailletet and Raoul Pictet. Cailletet also succeeded in liquefying air, and soon afterwards hydrogen was liquefied by Pictet under a pressure of six hundred and fifty atmospheres, and a cold of 170° Cent. below zero. It even became partly solidified, and he assures us that it fell on the floor with "the shrill noise of metallic hail." Thus then it was shown experimentally that there are no such things as absolutely permanent gases.

The kinetic theory of gases, now generally accepted, refers the elasticity of gases to a motion of translation of their molecules, and we are assured that in the case of hydrogen at a temperature of 60° Fahr. they move at an average rate of 6,225 feet in a second; while as regards their size, Loschmidt, who has since been confirmed by Stoney and Sir W. Thomson, calculates that each is at most a fifty-millionth of an inch in diameter.

We cannot, it would seem at present, hope for any increase of our knowledge of atoms by any improvement in the microscope. With our present instruments we can perceive lines ruled on glass of the ninety-thousandth of an inch apart. But, owing to the properties of light itself, the fringes due to interference begin to produce confusion at distances of a seventy-four-thousandth. It would seem then that, owing to the physical characters of light, we can, as Sorby has pointed out, scarcely hope for any great improvement so far as the mere visibility of structure is concerned, though in other respects no doubt much may be hoped for. At the same time, Dallinger and Royston Pigott have shown that, so far as the mere presence of simple objects is concerned, bodies of even smaller dimensions can be perceived.

Sorby is of opinion that in a length of an eighty-thousandth of an inch there would probably be from five hundred to two thousand molecules — five hundred, for instance, in albumen and two thousand in water. Even then, if we could construct microscopes far more powerful than any we now possess, they would not enable us to obtain by direct vision any idea of the ultimate molecules of matter. Sorby calculates that the smallest sphere of organic matter which could be clearly defined with our most powerful microscopes would contain many millions of molecules of albumen and water, and it follows that there may be an almost infinite number of structural characters in organic tissues, which we can at present foresee no mode of examining.

Electricity in the year 1831 may be considered to have just been ripe for its adaptation to practical purposes; it was but a few years previously, in 1819, that Oersted had discovered the deflective action of the current on the magnetic needle, that Ampère had laid the foundation of electro-dynamics, that Schweizzer had devised the electric coil or multiplier, and that Sturgeon had constructed the first electro-magnet. It was in 1831 that Faraday, the prince of pure experimentalists, announced his discoveries of voltaic induction and magneto-electricity, which with the other three discoveries constitute the principles of nearly all the telegraph instruments now in use; and in 1834 our knowledge of the nature of the electric current had been much advanced by the interesting experiment of Sir Charles Wheatstone, proving the velocity of the current in a metallic conductor to approach that of the wave of light.

Practical applications of these discoveries were not long in coming to the fore, and the first telegraph line on the Great Western Railway from Paddington to West Drayton was set up in 1838. In America Morse is said to have commenced to develop his recording instrument between the years 1832 and 1837.

In 1851, submarine telegraphy became an accomplished fact through the successful establishment of telegraphic communication between Dover and Calais. Submarine lines followed in rapid succession, crossing the English Channel and the German Ocean, threading their way through the Mediterranean, Black, and Red Seas, until in 1866, after two abortive attempts telegraphic communication was successfully established between the Old and New Worlds, beneath the Atlantic Ocean.

Duplex and quadruplex telegraphy, one of the most striking achievements of modern telegraphy, the result of the labors of several inventors, should not be passed over in silence. It not only serves for the simultaneous communication of telegraphic intelligence in both directions, but renders it possible for four instruments to be worked irrespectively of one another, through one and the same wire connecting to distant places.

Another more recent and perhaps still more wonderful achievement in modern telegraphy is the invention of the tele-

phone and microphone, by means of which the human voice is transmitted through the electric conductor, by mechanism that imposes through its extreme simplicity. In this connection the names of Reiss, Graham Bell, Edison, and Hughes are those chiefly deserving to be recorded.

By the electric transmission of power, we may hope some day to utilize at a distance such natural sources of energy as the falls of Niagara, and to work our cranes, lifts, and machinery of every description by means of sources of power arranged at convenient centres. To these applications the brothers Siemens have more recently added the propulsion of trains by currents passing through the rails, the fusion in considerable quantities of highly refractory substances, and the use of electric centres of light in horticulture as proposed by Werner and William Siemens. By an essential improvement by Faure of the Planté secondary battery, the problem of storing electrical energy appears to have received a practical solution, the real importance of which is clearly proved by Sir W. Thomson's recent investigation of the subject.

It would be difficult to assign the limits to which this development of electrical energy may not be rendered serviceable for the purposes of man.

As regards mathematics I have felt that it would be impossible for me, even with the kindest help, to write anything myself. Mr. Spottiswoode, however, has been so good as to supply me with the following memorandum.

In a complete survey of the progress of science during the half-century which has intervened between our first and our present meeting, the part played by mathematics would form no insignificant feature. To those indeed who are outside its enchanted circle it is difficult to realize the intense intellectual energy which actuates its devotees, or the wide expanse over which that energy ranges.

In the extension of mathematics it has happened more than once that laws have been established so simple in form, and so obvious in their necessity, as scarcely to require proof. And yet their application is often of the highest importance in checking conclusions which have been drawn from other considerations, as well as in leading to conclusions which, without their aid, might have been difficult of attainment. The same thing has occurred also in physics; and notably in the recognition of what has been termed the "law of the conservation of energy."

Energy has been defined to be "the capacity, or power, of any body, or system of bodies, when in a given condition, to do a measurable quantity of work." Such work may either change the condition of the bodies in question, or it may affect other bodies; but in either case energy is expended by the agent upon the recipient in performance of the work. The law then states that the total amount of energy in the agents and recipients taken together remains unaltered by the changes in question.

Now the principle on which the law depends is this: "that every kind of change among the bodies may be expressed numerically in one standard unit of change," viz., work done, in such wise that the result of the passage of any system from one condition to another may be calculated by mere additions and subtractions, even when we do not know how the change came about.

The history of a discovery, or invention, so simple at first sight, is often found to be more complicated the more thoroughly it is examined. That which at first seems to have been due to a single mind proves to have been the result of the successive action of many minds. Attempts more or less successful in the same direction are frequently traced out; and even unsuccessful efforts may not have been without influence on minds turned towards the same object. Lastly also, germs of thought, originally not fully understood, sometimes prove in the end to have been the first stages of growth towards ultimate fruit. The history of the law of the conservation of energy forms no exception to this order of events. There are those who discern even in the writings of Newton expressions which show that he was in possession of some ideas which, if followed out in a direct line of thought, would lead to those now entertained on the subjects of energy and of work. But however this may be, and whosoever might be reckoned among the earlier contributors to the general subject of energy, and to the establishment of its laws, it is certain that within the period of which I am now speaking, the names of Séguin, Clausius, Helmholtz, Mayer, and Colding, on the Continent, and those of Grove, Joule, Rankine, and Thomson, in this country, will always be associated with this great work.

Prof. Frankland has been so good as to draw up for me the following account of the progress of chemistry during the last half-century.

Most of the elements had been discovered before 1830, the majority of the rarer elements since the beginning of the century. In addition to these the following five have been discovered, three of them by Mosander, viz.: lanthanum in 1839, didymium in 1842, and erbium in 1843. Ruthenium was discovered by Claus in 1843, and niobium by Rose in 1844. Spectrum analysis has added five to the list, viz.: cæsium and rubidium, which were discovered by Bunsen and Kirchhoff in 1860; thallium, by Crookes in 1861; indium, by Reich and Richter in 1863; and gallium, by Lecoq de Boisbaudran in 1875.

In organic chemistry the views most generally held about the year 1830 were expressed in the radical theory of Berzelius. This theory, which was first stated in its electro-chemical and dualistic form by its author in 1817, received a further development at his hands in 1834 after the discovery of the benzoyl-radical by Liebig and Wöhler. In the same year (1834), however, a discovery was made by Dumas, which was destined profoundly to modify the electro-chemical portion of the theory, and even to overthrow the form of it put forth by Berzelius. Dumas showed that an electro-negative element, such as chlorine, might replace, atom for atom, an electro-positive element like hydrogen, in some cases without much alteration in the character of the compound. This law of substitution has formed a necessary portion of every chemical theory which has been proposed since its discovery, and its importance has increased with the progress of the science.

Chemists have been engaged in determining, by means of decompositions, the molecular architecture, or *constitution* as it is called, of various compounds, natural and artificial, and in verifying by synthesis the correctness of the views thus arrived at.

It was long supposed that an impassable barrier existed between inorganic and organic substances: that the chemist could make the former in his laboratory, while the latter could only be produced in the living bodies of animals or plants, — requiring for their construction not only chemical attractions, but a supposed "vital force." It was not until 1828 that Wöhler broke down this barrier by the synthetic production of urea, and since his time this branch of science in the hands of Hofmann has made great strides.

In connection with the rectification of the atomic weights it may be mentioned that a so-called natural system of the elements has been introduced by Mendelejeff (1869), in which the properties of the elements appear as a periodic function of their atomic weights. By the aid of this system it has been possible to predict the properties and atomic weights of undiscovered elements, and in the case of known elements to determine many atomic weights which had not been fixed by any of the usual methods. Several of these predictions have been verified in a remarkable manner. A periodicity in the atomic weights of elements belonging to the same class had been pointed out by Newlands about four years before the publication of Mendelejeff's memoir.

In mechanical science the progress has not been less remarkable than in other branches. Indeed to the improvements in mechanics we owe no small part of our advance in practical civilization, and of the increase of our national prosperity during the last fifty years.

This immense development of mechanical science has been to a great extent a consequence of the new processes which have been adopted in the manufacture of iron, for the following data with reference to which I am indebted to Captain Douglas Galton. About 1830, Neilson introduced the hot blast in the smelting of iron. At first a temperature of 600° or 700° Fahrenheit was obtained, but Cowper subsequently applied Siemens' regenerative furnace for heating the blast, chiefly by means of fumes from the black furnace, which were formerly wasted; and the temperature now practically in use is as much as 1400° or even more: the result is a very great economy of fuel and an increase of the output.

Bessemer, by his brilliant discovery, which he first brought before the British Association at Cheltenham in 1856, showed that iron and steel could be produced by forcing currents of atmospheric air through fluid pig metal, thus avoiding for the first time the intermediate process of puddling iron, and converting it by cementation into steel. These changes, by which steel can be produced direct from the blast furnace instead of by the more cumbersome processes formerly in use, have been followed by improvements in manipulation of the metal.

The inventions of Cort and others were known long before 1830, but we were then still without the most powerful tool in the hands of the practical metallurgist, viz., Nasmyth's steam hammer.

Steel can be produced as cheaply as

iron was formerly; and its substitution for iron as railway material and in shipbuilding, has resulted in increased safety in railway travelling, as well as in economy, from its vastly greater durability.

The introduction of iron, has, moreover, had a vast influence on the works of both the civil and military engineer. Before 1830, Telford had constructed an iron suspension turnpike-road bridge of five hundred and sixty feet over the Menai Straits; but this bridge was not adapted to the heavy weights of locomotive engines. At the present time, with steel at his command, Mr. Fowler is engaged in carrying out the design for a railway bridge over the Forth, of two spans of seventeen hundred feet each; that is to say, of nearly one-third of a mile in length.

But it is in railroads, steamers, and the electric telegraph, that the progress of mechanical science has most strikingly contributed to the welfare of man. To the latter I have already referred.

As regards railways, the Stockton and Darlington Railway was opened in 1825, but the Liverpool and Manchester Railway, perhaps the first truly passenger line, dates from 1830, while the present mileage of railways is over two hundred thousand miles, costing nearly 4,000,000,000*l.* sterling. It was not until 1838 that the "Sirius" and "Great Western" first steamed across the Atlantic. The steamer, in fact, is an excellent epitome of the progress of the half-century; the paddle has been superseded by the screw; the compound has replaced the simple engine; wood has given place to iron, and iron in its turn to steel. The saving in dead weight, by this improvement alone, is from ten to sixteen per cent. The speed has been increased from nine knots to fifteen, or even more. Lastly, the steam-pressure has been increased from less than five pounds to seventy pounds per square inch, while the consumption of coal has been brought down from five or six pounds per horse-power to less than two. It is a remarkable fact that not only is our British shipping rapidly on the increase, but it is increasing relatively to that of the rest of the world. In 1860 our tonnage was 5,700,000 against 7,200,000; while it may now be placed as 8,500,000 against 8,200,000, so that considerably more than half the whole shipping of the world belongs to this country.

If I say little with reference to economic science and statistics, it is because time, not materials, are wanting.

I scarcely think that in the present state of the question I can be accused of wandering into politics if I observe that the establishment of the doctrine of free trade as a scientific truth falls within the period under review.

In education some progress has been made towards a more rational system. When I was at a public school, neither science, modern languages, nor arithmetic formed any part of the school system. This is now happily changed. Much, however, still remains to be done. Too little time is still devoted to French and German, and it is much to be regretted that even in some of our best schools they are taught as dead languages. Lastly, with few exceptions, only one or two hours on an average are devoted to science. We have, I am sure, none of us any desire to exclude, or discourage, literature. What we ask is that, say, six hours a week each should be devoted to mathematics, modern languages, and science, an arrangement which would still leave twenty hours for Latin and Greek. I admit the difficulties which schoolmasters have to contend with; nevertheless, when we consider what science has done and is doing for us, we cannot but consider that our present system of education is, in the words of the Duke of Devonshire's Commission, little less than a national misfortune.

In agriculture the changes which have occurred in the period since 1831 have been immense. The last half-century has witnessed the introduction of the modern system of subsoil drainage founded on the experiments of Smith of Deanston. The thrashing and drilling machines were the most advanced forms of machinery in use in 1831. Since then there have been introduced the steam-plough; the mowing-machine; the reaping-machine, which not only cuts the corn but binds it into sheaves; while the steam-engine thrashes out the grain and builds the ricks. Science has thus greatly reduced the actual cost of labor, and yet it has increased the wages of the laborer.

It was to the British Association, at Glasgow in 1841, that Baron Liebig first communicated his work "On the Application of Chemistry to Vegetable Physiology," while we have also from time to time received accounts of the persevering and important experiments which Mr. Lawes, with the assistance of Dr. Gilbert, has now carried on for more than forty years at Rothamsted, and which have given so great an impulse to agriculture

by directing attention to the principles of cropping, and by leading to the more philosophical application of manures.

I feel that in quitting Section F so soon, I owe an apology to our fellow-workers in that branch of science, but I doubt not that my shortcomings will be more than made up for by the address of their excellent president, Mr. Grant-Duff, whose appointment to the governorship of Madras, while occasioning so sad a loss to his friends, will unquestionably prove a great advantage to India, and materially conduce to the progress of science in that country.

Moreover, several other subjects of much importance, which might have been referred to in connection with these latter sections, I have already dealt with under their more purely scientific aspect.

Indeed, one very marked feature in modern discovery is the manner in which distinct branches of science have thrown, and are throwing, light on one another. Thus the study of geographical distribution of living beings, to the knowledge of which our late general secretary, Mr. Sclater, has so greatly contributed, has done much to illustrate ancient geography. The existence of high northern forms in the Pyrenees and Alps points to the existence of a period of cold when Arctic species occupied the whole of habitable Europe. Wallace's line — as it has been justly named after that distinguished naturalist — points to the very ancient separation between the Malayan and Australian regions; and the study of corals has thrown light upon the nature and significance of atolls and barrier reefs.

In studying the antiquity of man, the archæologist has to invoke the aid of the chemist, the geologist, the physicist, and the mathematician. The recent progress in astronomy is greatly due to physics and chemistry. In geology the composition of rocks is a question of chemistry; the determination of the boundaries of the different formations falls within the limits of geography; while palæontology is the biology of the past.

And now I must conclude. I fear I ought to apologize to you for keeping you so long, but still more strongly do I wish to express my regret that there are almost innumerable researches of great interest and importance which fall within the last fifty years (many even among those with which our Association has been connected) to which I have found it impossible to refer. Such for instance are, in biology alone, Owen's memorable report on the homologies of the vertebrate skeleton, Carpenter's laborious researches on the microscopic structure of shells, the reports on marine zoology by Allman, Forbes, Jeffreys, Spence Bate, Norman, and others; on Kent's Cavern by Pengelly; those by Duncan on corals; Woodward on crustaceæ; Carruthers, Williamson, and others on fossil botany, and many more. Indeed no one who has not had occasion to study the progress of science throughout its various departments can have any idea how enormous — how unprecedented — the advance has been.

Though it is difficult, indeed impossible, to measure exactly the extent of the influence exercised by this Association, no one can doubt that it has been very considerable. For my own part, I must acknowledge with gratitude how much the interest of my life has been enhanced by the stimulus of our meetings, by the lectures and memoirs to which I have had the advantage of listening, and above all, by the many friendships which I owe to this Association.

Summing up the principal results which have been attained in the last half-century we may mention (over and above the accumulation of facts) the theory of evolution, the antiquity of man, and the far greater antiquity of the world itself; the correlation of physical forces and the conservation of energy; spectrum analysis and its application to celestial physics; the higher algebra and the modern geometry; lastly, the innumerable applications of science to practical life — as, for instance, in photography, the locomotive engine, the electric telegraph, the spectroscope, and most recently the electric light and the telephone.

To science, again, we owe the idea of progress. The ancients, says Bagehot, "had no conception of progress; they did not so much as reject the idea; they did not even entertain it." It is not, I think, now going too far to say that the true test of the civilization of a nation must be measured by its progress in science. It is often said, however, that great and unexpected as the recent discoveries have been, there are certain ultimate problems which must ever remain unsolved. For my part I would prefer to abstain from laying down any such limitations. When Park asked the Arabs what became of the sun at night, and whether the sun was always the same, or new each day, they replied that such a question was childish, and entirely beyond the reach of human

investigation. I have already mentioned that, even as lately as 1842, so high an authority as Comte treated as obviously impossible and hopeless any attempt to determine the chemical composition of the heavenly bodies. Doubtless there are questions, the solution of which we do not as yet see our way even to attempt; nevertheless the experience of the past warns us not to limit the possibilities of the future.

But however this may be, though the progress made has been so rapid, and though no similar period in the world's history has been nearly so prolific of great results, yet, on the other hand, the prospects of the future were never more encouraging. We must not, indeed, shut our eyes to the possibility of failure; the temptation to military ambition; the tendency to over-interference by the State; the spirit of anarchy and socialism; these and other elements of danger may mar the fair prospects of the future. That they will succeed, however, in doing so, I cannot believe. I cannot but feel confident hope that fifty years hence, when perhaps the city of York may renew its hospitable invitation, my successor in this chair — more competent, I trust, than I have been to do justice to so grand a theme — will have to record a series of discoveries even more unexpected and more brilliant than those which I have, I fear so imperfectly, attempted to bring before you this evening. For one great lesson which science teaches is, how little we yet know, and how much we have still to learn.

From Fraser's Magazine.

IN TRUST.

THE STORY OF A LADY AND HER LOVER.

CHAPTER XXXIV.

(continued.)

THE tranquil little old-fashioned high street of a country town on an August morning is as tranquillizing a place as it is possible to imagine. It was more quiet, more retired, and what Rose called dull, than the open fields. All the irregular roofs — here a high peaked gable, there an overhanging upper story, the red pediment of the Queen Anne house which was Mr. Loseby's office and dwelling, the clustered chimneys of the almshouses — how they stood out upon the serene blueness of the sky and brilliancy of the sunshine! And underneath how shady it was, how cool on the shady side; in what a depth of soft shelter, contrasting with the blaze on the opposite pavement, was the deep cavernous doorway of the Black Bull, and the show in the shop-windows, where one mild wayfarer in muslin was gazing in, making the quiet more apparent! A boy in blue, with a butcher's tray upon his head, was crossing the street; two little children in sun-bonnets were going along with a basket between them; and in the extreme distance was a costermonger's cart with fruit and vegetables, which had drawn some women to their doors. Of itself the cry of the man who was selling these provisions was not melodious, but it was so softened by the delight of the still, sweet morning air, in which there was still a whiff of dew, that it toned down into the general harmony, adding a not unpleasant sense of common affairs, the leisurely bargain, the innocent acquisition, the daily necessary traffic which keeps homes and tables supplied. The buying and selling of the rosy-cheeked apples and green cabbages belonged to the quiet ease of living in such a softened, silent place. Rose did not enter into the sentiment of the scene; she was herself a discord in it. In noisy London she would have been more at home; and yet the quiet soothed her, though she interrupted and broke it up with the sharp pat of her high-heeled boot, and the crackle of her French muslin. She was not disposed toward the limp, untidy draperies that are "the fashion." Her dress neither swept the pavement nor was huddled up about her knees like the curtains of a shabby room, but billowed about her in crisp puffs, with enough of starch; and her footstep, which was never languid, struck the pavement more sharply than ever in the energy of her discomposure. The butcher in the vacant open shop, from which fortunately most of its contents had been removed, came out to the door bewildered to see who it could be; and one of Mr. Loseby's clerks poked out of a window in his shirt-sleeves, but drew back again much confused and abashed when he caught the young lady's eye. The clerks in Mr. Loseby's office were not, it may be supposed, of an order to hope for any notice from a Miss Mountford of Mount; yet in the twenties both boys and girls have their delusions on that point. Rose, however, noticed the young clerk no more

than if he had been a costermonger, or one of the cabbages that worthy was selling; yet the sight of him gave her a new idea. Mr. Loseby! any Mountford of Mount had a right to speak to Mr. Loseby, whatever trouble he or she might be in. And Rose knew the way into his private room as well as if she had been a child of the house. She obeyed her sudden impulse, with a great many calculations equally sudden springing up spontaneously in her bosom. It would be well to see what Mr. Loseby knew; and then he might be able to think of some way of punishing Cosmo; and then — in any case it would be a relief to her mind. The young clerk in his shirt-sleeves, yawning over his desk, heard the pat of her high heels coming up the steps at the door, and could not believe his ears. He addressed himself to his work with an earnestness which was almost solemn. Was she coming to complain of his stare at her from the window? or was it to ask Mr. Loseby, perhaps, who was that nice-looking young man in the little room close to the door?

Mr. Loseby's room was apt to look dusty in the summer, though it was in fact kept in admirable order. But the Turkey carpet was very old and penetrated by the sweeping of generations, and the fireplace always had a tinge of ashes about it. To-day the windows were open, the Venetian blinds down, and there was a sort of green dimness in the room, in which Rose, dazzled by the sunshine out-of-doors, could for the moment distinguish nothing. She was startled by Mr. Loseby's exclamation of her name. She thought for the moment that he had found her out internally as well as externally, and surprised her secret as well as herself. "Why, little Rose!" he said. He was sitting in a coat made of yellow Indian grass silk which did not accord so well as his usual shining blackness with the glistening of his little round bald head, and his eyes and spectacles. His table was covered with papers done up as bundles with all kinds of red tape and bands. "This is a sight for sore eyes," he said. "You are like summer itself stepping into an old man's dusty den; come and sit near me and let me look at you, my summer Rose! I don't know which is the freshest and the prettiest!" said the old lawyer, waving his hand toward a beautiful luxurious blossom of *La France* which was on his table in a Venetian glass. He had a fancy for pretty things.

"Oh! I was passing and I thought I would come in — and see you," Rose said.

Mr. Loseby had taken her appearance very quietly, as a matter of course: but when she began to explain he was startled. He pushed his spectacles up upon his forehead and looked at her curiously. "Ah!" he said, "that was kind of you — to come with no other object than to see an old man."

"Oh!" cried Rose, confused, "I did not say I had no other object, Mr. Loseby. I want you to tell me — is — is — Anne likely to settle upon the Dower-house? I do so want to know."

"My dear child, your mother has as much to do with it as Anne has. You will hear from her better than from me."

"To be sure, that is true," said Rose; and then, after a pause, "Oh, Mr. Loseby, is it really, really true that Cosmo Douglas is not going to marry Anne? Isn't it shameful? to bring her into such trouble and then to forsake her. Couldn't he be made to marry her? I think it is a horrid shame that a man should behave like that and get no punishment at all."

Mr. Loseby pushed his spectacles higher and higher; he peered at her through the partial light with a very close scrutiny. Then he rose and half drew up one of the blinds. But even this did not satisfy him. "Do you think, then," he said at last, "that it would be a punishment to a man to marry Anne?"

"It would depend upon what his feelings were," said Rose with much force of reason; "if he wanted, for example, to marry — somebody else."

"Say Rose — instead of Anne," said the acute old lawyer, with a grin which was very much like a grimace.

"I am sure I never said that!" cried Rose. "I never, never said it, nor so much as hinted at it. He may say what he pleases, but I never, never said it! you always thought the worst of me, Mr. Loseby, Anne was always your favorite; but you need not be unjust. Haven't I come here express to ask you? Couldn't he be made to marry her? Why, they were engaged; everybody has talked of them as engaged. And if it is broken off, think how awkward for Anne."

Mr. Loseby took off his spectacles, which had been twinkling and glittering upon his forehead like a second pair of eyes; this was a very strong step denoting unusual excitement; and wiped them deliberately while he looked at Rose. He had the idea, which was not a just

idea, that either Rose had been exercising her fascinations upon her sister's lover, or that she had been in her turn fascinated by him. "You saw a good deal of Mr. Douglas in town?" he said, looking at her keenly, always polishing his spectacles; but Rose sustained the gaze without shrinking.

"Oh, a great deal," she said, "he went everywhere with us. He was very nice to mamma and me. Still, I do not care a bit about him, if he behaves badly to Anne; but he ought not to be let off — he ought to be made to marry her. I told him — what I was quite ready to do ——"

"And what are you quite ready to do, if one might know?" Mr. Loseby was savage. His grin at her was full of malice and all uncharitableness.

"Oh, you know very well!" cried Rose, "it was you first who said —— Will you tell me one thing, Mr. Loseby," she ran on, her countenance changing: "what does it mean by the will of 1858?"

"What does what mean?" The old lawyer was roused instantly. It was not that he divined anything, but his quick instincts forestalled suspicion, and there suddenly gleamed over him a consciousness that there was something to divine.

"Oh! — I mean," said Rose, correcting herself quickly, "what is meant by the will of 1858? I think I ought to know."

Mr. Loseby eyed her more and more closely. "I wonder," he said, "how you know that there was a will of 1858?"

But there was nothing in his aspect to put Rose on her guard. "I think I ought to know," she said, "but I am always treated like a child. And if things were to turn round again, and everything to go back, and me never to have any good of it, I wonder what would be the use at all of having made any change."

Mr. Loseby put on his spectacles again. He wore a still more familiar aspect when he had his two spare eyes pushed up from his forehead, ready for use at a moment's notice. He was on the verge of a discovery, but he did not know as yet what that discovery would be.

"That is very true," he said, "and it shows a great deal of sense on your part: for if everything were to turn round it would certainly be no use at all to have made any change. The will of 1858 is the will that was made directly after your father married for the second time; it was made to secure her mother's fortune to your sister Anne."

"Without even the least thought of me!" cried Rose, indignant.

"It was before you were born," said Mr. Loseby, with a laugh that exasperated her.

"Oh!" she cried, with an excess of that fury which had frightened Keziah; "how horrible people are! how unkind things are! how odious it is to be set up and set down and never know what you are, or what is going to happen! Did I do anything to Cosmo Douglas to make him break off with Anne? is it my fault that he is not going to marry her after all? and yet it will be me that will suffer, and nobody else at all. Mr. Loseby, can't it be put a stop to? I know you like Anne best, but why should not I have justice though I am not Anne? Oh, it is too bad! it is cruel — it is wicked! Only just because papa was cross and out of temper, and another man is changeable, why should I be the one to suffer? Mr. Loseby, I am sure if you were to try you could change it; you could stop us from going back to this will of 1858 that was made before I was born. If it was only to burn that bit of paper, that horrid letter, that thing! I had nearly put it into the fire myself. Oh!" Rose wound up with a little cry; she came suddenly to herself out of her passion and indignation and shrank away, as it were, into a corner and confronted the old lawyer with a pale and troubled countenance, like a child found out. What had she done? She had betrayed herself. She looked at him alarmed, abashed, in a sudden panic which was cold, not hot with passion like her previous one. What could he cause to be done to her? What commotion and exposure might he make? She scarcely dared to lift her eyes to his face; but yet would not lose sight of him lest something might escape her, which he should do.

"Rose," he said with a tone of great severity, yet a sort of chuckle behind it which gave her consolation, "you have got hold of your father's letter to Anne."

"Well," she said, trembling but defiant, "it had to be read some time, Mr. Loseby. It was only about us two; why should we wait so many years to know what was in it? A letter from papa! Of course we wanted to know what it said."

"We! Does Anne know, too?" he cried, horrified. And it gleamed across Rose's mind for one moment that to join Anne with herself would be to diminish her own criminality. But after a moment she relinquished this idea, which was not tenable. "Oh, please!" she cried, "don't let Anne know! She would not let me

touch it. But why shouldn't we touch it? It was not a stranger who wrote it — it was our own father. Of course I wanted to know what he said."

There was a ludicrous struggle on Mr. Loseby's face. He wanted to be severe, and he wanted to laugh. He was disgusted with Rose, yet very lenient to the little pretty child he had known all his life; and his heart was dancing with satisfaction at the good news thus betrayed to him. "I have got a duplicate of it in my drawer, and it may not be of much use when all is said. Since you have broken your father's confidence, and violated his last wishes, and laid yourself open to all sorts of penalties, you — may as well tell me all about it," he said.

When Rose emerged into the street after this interview, she came down the steps straight upon Willie Ashley, who was mooning by, not looking where he was going, and in a somewhat disconsolate mood. He had been calling upon Mrs. Mountford, but Rose had not been visible. Willie knew it was "no use" making a fool of himself, as he said, about Rose; but yet when he was within reach he could not keep his feet from wandering where she was. When he thus came in her way accidentally, his glum countenance lighted up into a blaze of pleasure. "Oh, here you are!" he cried, in a delighted voice. "I've been to Saymore's and seen your mother, but you were not in." This narrative of so self-evident a fact made Rose laugh, though there were tears of agitation and trouble on her face, which made Willie conclude that old Loseby (confound him!) had been scolding her for something. But when Rose laughed all was well.

"Of course I was not in. It is so tiresome there — nothing to do, nowhere to go. I can't think why Anne wishes to keep us here, of all places in the world."

"But you are coming to the Dower-house at Lilford? Oh! say you are coming, Rose. I know some people that would dance for joy."

"What people? I don't believe anybody cares where we live," said Rose, with demure consciousness, walking along by his side with her eyes cast down, but a smile hovering about the corners of her mouth. Confession had been of use to her, and had relieved her soul, even though Mr. Loseby had no power to confer absolution.

"Don't we? Well, there's Charley for one; he has never had a word to throw to a dog since you went away. Though a fellow may know it is no good, it's always something to know that you're there."

"What is no good?" said Rose, with extreme innocence. And thus the two went back, talking — of matters very important and amusing, through the coolness and sweetness and leisure of the little country street. Anne, who was seated in the bow-window of the sitting-room with her books and her papers, could not help breathing forth a little sigh as she looked out and saw them approaching, so young and so like each other. "What a pity!" she said to herself. So far as she herself was concerned, it was far more than a pity; but even for Rose ——

"What is a pity?" said Mrs. Mountford; and she came and looked out over Anne's shoulder, being a little concerned about her child's absence. When she saw the pair advancing she flushed all over with annoyance and impatience. "Pity! it must be put a stop to," she cried; "Willie Ashley was always out of the question; a boy with next to nothing. But now it is not to be thought of for a moment. I rely upon you, if you have any regard for your sister, to put a stop to it, Anne!"

CHAPTER XXXV.

THE Dower-house at Lilford was fixed upon shortly after by general consent. It was an old house, but showed its original fabric chiefly in the tall stacks of chimneys which guaranteed its hospitable hearths from smoke, and gave an architectural distinction to the pile of building, the walls of which were all matted in honeysuckles, roses, and every climbing plant that can be imagined, embroidering themselves upon the background of the ivy, which filled every crevice. And the pleasure of furnishing, upon which Mr. Loseby had been cunning enough to enlarge, as an inducement to the ladies to take possession of this old dwelling-place, proved as great and delightful as he had represented it to be. It was a pleasure which none of the three had ever as yet experienced. Even Mrs. Mountford had never known the satisfaction, almost greater than that of dressing one's house and making it beautiful. She had been taken as a bride to the same furniture which had answered for her predecessor, and though in the course of the last twenty years something had no doubt been renewed, there is no such gratification in a new carpet or curtains, which must be chosen either to suit the previous

furniture, or of those homely tints, which, according to the usual formula of the shops, "would look well with anything," as in the blessed task of renovating a whole room at once. They had everything to do here, new papers (bliss! for you may be sure Mrs. Mountford was too fashionable to consult anybody but Mr. Morris on this important subject), and a whole array of new old furniture. They did not transfer the things that had been left at Mount, which would have been, Mrs. Mountford felt, the right thing to do, but merely selected a few articles from the mass which nobody cared for. The result they all flattered themselves was fine. Not a trace of newness appeared in all the carefully decorated rooms. A simulated suspicion of dirt, a ghost of possible dust, was conjured up by the painter's skill to make everything perfect — not in the way of a vulgar copy of that precious element which softens down the too perfect freshness, but, by a skilful touch of art, reversing the old principle of economy, and making the "new things look as weel's the auld." This process, with all its delicate difficulties, did the Mountford family good in every way. To Anne it was the most salutary and health-giving discipline. It gave her scope for the exercise of all those secondary tastes and fancies, which keep the bigger and more primitive sentiments in balance. To be anxious about the harmony of the new curtains, or concerned about the carpet is sometimes salvation in its way, and there were so many questions to decide — things for beauty and things for use — the character of every room and the meaning of it, which are things that have to be studied nowadays before we come so far down as to consider the conveniences of it, what you are to sit upon, or lie upon, though these two are questions almost of life and death. Anne was plunged into the midst of all these questions. Besides her serious business in the management of the estate which Mr. Loseby had taken care should occupy her more and more, there were a hundred trivial play-anxieties always waiting for her, ready to fill up every crevice of thought. She had, indeed, no time to think. The heart which had been so deeply wounded, which had been compelled to give up its ideal and drop one by one the illusions it had cherished, seemed pushed into a corner by this flood of occupation. Anne's mind, indeed, was in a condition of exhaustion, something similar to that which sometimes deadens the sensations of mourners after a death which in anticipation has seemed to involve the loss of all things. When all is over, and the tortures of imagination are no longer added to those of reality, a kind of calm steals over the wounded soul. The worst has happened; the blow has fallen. In this fact there is quiet at least involved, and now the sufferer has nothing to think of but how to bear his pain. The wild rallying of all his forces to meet a catastrophe to come is no longer necessary. It is over, and though the calm may be but "a calm despair," yet it is different from the anguish of looking forward. And in Anne's case there was an additional relief. For a long time past she had been forcing upon herself a fictitious satisfaction. The first delight of her love, which she had described to Rose, as the power of saying everything to her lover, pouring out her whole heart in the fullest confidence that everything would interest him and all be understood, had long ago begun to ebb away from her. As time went on, she had fallen upon the pitiful expedient of writing to Cosmo without sending her letters, thus beguiling herself by the separation of an ideal Cosmo, always the same, always true and tender, from the actual Cosmo whose attention often flagged, and who sometimes thought the things that occupied her trivial, and her way of regarding them foolish or high-flown. Yes, Cosmo too, had come to think her high-flown; he had been impatient even of her fidelity to himself; and gradually it had come about that Anne's communications with him were but carefully prepared abridgments of the genuine letters which were addressed to — some one whom she had lost, some one, she could not tell who, on whom her heart could repose, but who was not, so far as she knew, upon this unresponsive earth. All this strain, this dual life, was over now. No attempt to reconcile the one with the other was necessary. It was all over; the worst had happened; there was no painful scene to look forward to, no gradual loosening of a tie once so dear; but whatever was to happen had happened. How she might have felt the blank, had no such crowd of occupations come in to fill up her time and thoughts, is another question. But, as it was, Anne had no time to think of the blank. In the exhaustion of the revolution accomplished she was seized hold upon by all these crowding occupations, her thoughts forced into new channels, her every moment busy. No soul comes through such

a crisis without much anguish and many struggles, but Anne had little time to indulge herself. She had to stand to her arms, as it were, night and day. She explained her position to Mr. Loseby, as has been said, and she informed her stepmother briefly of the change; but to no one else did she say a word.

Charley was taken entirely by surprise. He gasped in his agitation, "I — try? But she would not look at me. What have I to offer her?" he said with a groan.

Upon which the rector repeated that ungracious formula, "You may not be very much, but you're better than nothing. No," the father said, shaking his head regretfully, "we are none of us very much to look at; but, Lord bless my soul, think of Anne, Anne settling down as a single woman: an old maid!" he cried, with almost a shriek of dismay. The two men were both quite subdued, broken down by the thought. They could not help feeling in their hearts that to be anybody's wife would be better than that.

But when they had gone on for about half an hour, and the moon had risen silvery over the roofs of the cottages, showing against the sky the familiar and beloved spire of their own village church, Charley, who had said nothing all the time, suddenly found a voice. He said, in his deep and troubled bass, as if his father had spoken one minute ago instead of half an hour, "Heathcote Mountford is far more likely to do something with her than I."

"Do you think so?" cried the rector, who had not been, any more than his son, distracted from the subject, and was as unconscious as Charley was of the long pause. "She does not know him as she does you."

"That is just the thing," said the curate with a sigh. "She has known me all her life, and why should she think any more about me? I am just Charley, that is all, a kind of brother, but Mountford is a stranger. He is a clever fellow, cleverer than I am; and even if he were not," said poor Charley, with a tinge of bitterness, "he is new, and what he says sounds better, for they have not heard it so often before. And then he is older, and has been all about the world; and besides — well," the curate broke off with a harsh little laugh, "that is about all, sir. He is he, and I am me — that's all."

"If that is what you think," said the rector, who had listened to all this with very attentive ears, pausing, as he took hold of the upper bar of his own gate, and raising a very serious countenance to his son, "if this is really what you think, Charley — you may have better means of judging — we must push Mountford. Anything would be better," he said solemnly, "than to see Anne an old maid. And she's capable of doing that," he added, laying his hand upon his son's in the seriousness of the moment. "She is capable of doing it, if we don't mind."

Charley felt the old hand chill him like something icy and cold. And he did not go in with his father, but took a pensive turn round the garden in the moonlight. No, she would never walk with him there. It was too presumptuous a thought. Never would Anne be the mistress within, never would it be permitted to Charley to call her forth in the moonlight in the sweet domestic sanctity of home. His heart stirred within him for a moment, then sank, acknowledging the impossibility. He breathed forth a vast sigh as he lit the evening cigar, which his father did not like him to smoke in his presence, disliking the smell, like the old-fashioned person he was. The curate walked round and round the grass-plats, sadly enjoying this gentle indulgence. When he tossed the end away, after nearly an hour of silent musing, he said to himself, "Mountford might do it," with another sigh. It was hard upon Charley. A stranger had a better chance than himself, a man that was nothing to her, whom she had known for a few months only. But so it was; and it was noble of him that he wished Mountford no manner of harm.

This was the state of affairs between the rectory and the Dower-house, which, fortunately, was on the very edge of Lilford parish, and therefore could, without any searchings of heart on the part of the new vicar there, permit the attendance of the ladies at the church which they loved. When Willie was home at Christmas his feet wore a distinct line on the road. He was always there, which his brother thought foolish and weak, since nothing could ever come of it. Indeed, if anything did exasperate the curate, it was the inordinate presumption and foolishness of Willie, who seemed really to believe that Rose would have something to say to him. Rose! who was the rich one of the house, and whose eyes were not magnanimous to observe humble merit like those of her sister. It was setting that little thing up, Charley felt with hot indignation, as if she were superior to Anne. But then Willie was al-

ways more complacent, and thought better of himself than did his humble-minded brother. As for Mr. Ashley himself, he never intermitted his anxious watch upon Anne. She was capable of it. No doubt she was just the very person to do it. The rector could not deny that she had provocation. If a woman had behaved to him like that, he himself, he felt, might have turned his back upon the sex, and refused to permit himself to become the father of Charley and Willie.

That was putting the case in a practical point of view. The rector felt a cold dew burst out upon his forehead, when it gleamed across him with all the force of a revelation, that in such a case Charley and Willie might never have been. He set out on the spot to bring this tremendous thought before Anne, but stopped short and came back after a moment depressed and toned down. How could he point out to Anne the horrible chance that perhaps two such paragons yet unborn might owe their non-existence (it was difficult to put it into words even) to her? He could not say it; and thus lost out of shyness or inaptness, he felt (for why should there have been any difficulty in stating it?), by far the best argument that had yet occurred to him. But though he relinquished his argument he did not get over his anxiety. Anne an old maid! it was a thought to move heaven and earth.

In the mean time Heathcote Mountford felt as warmly as any one could have desired the wonderful brightening of the local horizon which followed upon the ladies' return. The Dower-house was for him also within the limits of a walk, and the decoration and furnishing which went on to a great extent after they had taken possession, the family bivouacking pleasantly in the mean time, accepting inconveniences with a composure which only ladies are capable of under such circumstances, gave opportunity for many a consultation and discussion. It was no obsequious purpose of pleasing her which made Heathcote almost invariably agree with Anne when questions arose. They were of a similar mould, born under the same star, to speak poetically, with a natural direction of their thoughts and fancies in the same channel, and an agreement of tastes perhaps slightly owing to the mysterious affinities of the powerful and wide-spreading family character which they both shared. By-and-by it came to be recognized that Anne and Heathcote were each other's natural allies. One of them even, no one could remember which' playfully identified a certain line of ideas as "our side." When the winter came on and country pleasures shrank as they are apt to do, to women, within much restricted limits, the friendship between these two elder members of the family grew. That they were naturally on the same level, and indeed about the same age, nobody entertained any doubt, aided by that curious foregone conclusion in the general mind (which is either a mighty compliment or a contemptuous insult to a woman) that a girl of twenty-one is in reality quite the equal and contemporary, so to speak, of a man of thirty-five. Perhaps the assumption was more legitimate than usual in the case of these two; for Anne, always a girl of eager intelligence and indiscriminate intellectual appetite, had lived much of her life among books, and was used to unbounded intercourse with the matured minds of great writers, besides having had the ripening touch of practical work, and of that strange bewildering conflict with difficulties unforeseen which is called disenchantment by some, disappointment by others, but which is perhaps to a noble mind the most certain and unfailing of all maturing influences. Heathcote Mountford had not lived so much longer in the world without having known what that experience was, and in her gropings darkly after the lost ideal, the lost paradise which had seemed so certain and evident at her first onset, Anne began to feel that now and then she encountered her kinsman's hand in the darkness with a reassuring grasp. This consciousness came to her slowly, she could scarcely tell how; and whether he himself was conscious of it at all she did not know. But let nobody think this was in the way of lovemaking or overtures of a new union. When a girl like Anne, a young woman full of fresh hope and confidence and all belief in the good and true, meets on her outset into life with such a "disappointment," as people call it, it is not alone the loss of her lover that moves her. She has lost her world as well. Her feet stumble upon the dark mountains; the steadfast sky swims round her in a confusion of bewildering vapors and sickening giddy lights. She stands astonished in the midst of a universe going to pieces, like Hamlet in those times which were out of joint. All that was so clear to her has become dim. If she has a great courage, she fights her way through the blinding mists, not knowing where she is going, feeling only a dull necessity to

keep upright, to hold fast to something. And if by times a hand reaches hers thrust out into the darkness, guiding to this side or that, her fingers close upon it with an instinct of self-preservation. This I suppose, is what used to be called catching a heart in the rebound. Heathcote himself was not thinking of catching this heart in its rebound. He was not himself aware when he helped her; but he was dimly conscious of the pilgrimage she was making out of the gloom back into the light.

This was going on all the winter through. Mr. Morris's papers, and all the harmonies or discordances of the furniture, and the struggle against too much of Queen Anne, and the attempts to make some compromise that could bear the name of Queen Victoria, afforded a dim amusement, a background of trivial fact and reality which it was good to be able always to make out among the mists. Love may perish, but the willow-pattern remains. The foundation of the world may be shaken so long as the dado is steady! Anne had humor enough to take all the good of all these helps, to smile, and then laugh, at all the dimly comic elements around her, from the tremendous seriousness of the decorator, up to the distress and perplexity of the rector and his alarmed perception of the possible old maid in her. Anne herself was not in the least alarmed by the title which made Mr. Ashley shiver. The idea of going over all that course of enchantment once again was impossible. It had been enchantment once — a second time it would be — what would a second time be? impossible! That was all that could be said. It was over for her, as certainly as life of this kind is over for a widow. To be sure it is not always over even for a widow; but Anne, highly fantastical as became her temper and her years, rejected with a lofty disdain any idea of renewal. Nevertheless, toward the spring, after the darkness had begun to lighten a little, when she found at a hard corner that metaphorical hand of Heathcote taking hers, helping her across a bad bit of the road, her heart was conscious of a throb of pleasure.

CHAPTER XXXVI.

THE LAST.

ROSE'S behavior had been a trouble and a puzzle to her family during the latter part of the year. Whether it was that the change from the dissipation of London and the variety of their wanderings "abroad" to the dead quiet of country life, in which the young heiress became again little Rose and nothing more, was a change beyond the powers of endurance, or whether it was some new spring of life in her, nobody could tell. She became fretful and uncertain in temper, cross to her mother, and absolutely rebellious against Anne, to whom she spoke in a way which even Mrs. Mountford was moved to declare "very unbecoming."

"You ought to remember that Anne is your elder sister at least, whatever else," the mother said, who had always been a little aggrieved by the fact that, even in making her poor, her father had given to Anne a position of such authority in the house.

"Mamma," Rose had cried, flushed and furious, "she may manage my property, but she shall not manage me."

The little girl talked a great deal about her property in those days, except when Mr. Loseby was present, who was the only person, her mother said, who seemed to exercise any control over her. By and-by, however, this disturbed condition of mind calmed down. She gave Willie Ashley a great deal of "encouragement" during the Christmas holidays; then turned round upon him at Easter, and scarcely knew him. But this was Rose's way, and nobody minded very much. In short, the curate was cruelly consoled by his brother's misadventure. It is a sad confession to have to make; but, good Christian as he was, Charley Ashley felt better when he found that Willie had tumbled down from confidence to despair.

"I told you you were a fool all the time," he said, with that fraternal frankness which is common among brothers; and he felt it less hard afterward to endure the entire abandonment in his own person of any sort of hope.

And thus the time went on. Routine reasserted those inalienable rights which are more potent than anything else on earth, and everybody yielded to them. The Mountfords, like the rest, owned that salutary bondage. They half forgot the things that had happened to them — Anne her disenchantments, Rose her discovery, and Mrs. Mountford that life had ever differed much from its present aspect. All things pass away except dinner-time and bed-time, the day's business and the servants' meals.

But when the third year was nearly completed from Mr. Mountford's death,

the agitation of past times began to return again. Rose's temper began to give more trouble than ever, and Mr. Loseby's visits were more frequent, and even Anne showed a disturbance of mind unusual to her. She explained this to her kinsman Heathcote one autumn afternoon, a few days before Rose's birthday. He had asked the party to go and see the last batch of the cottages, which had been completed — a compliment which went to Anne's heart — according to her plans. But Heathcote had stopped to point out some special features to his cousin, and these two came along some way after the others. The afternoon was soft and balmy, though it was late in the year. The trees stood out in great tufts of yellow and crimson against the sky, which had begun to emulate their hues. The paths were strewed, as for a religious procession, with leaves of russet and gold, and the low sun threw level lights over the slopes of the park, which were pathetically green with the wet and damp of approaching winter.

"The season is all stillness and completion," Anne said; "but I am restless. I don't know what is the matter with me. I want to be in motion — to do something from morning to night."

"You have had too much of the monotony of our quiet life."

"No; you forget I have always been used to the country; it is not monotonous to me. Indeed, I know well enough what it is," said Anne with a smile. "It is Rose's birthday coming so near. I will lose my occupation, which I am fond of — and what shall I do?"

"I could tell you some things to do."

"Oh, no doubt I shall find something," said Anne with heightened color. "I cannot find out from Rose what she intends. It must be a curious sensation for a little girl — who has never been anything but a little girl — to come into such a responsibility all at once."

"But you were no older than she — when you came into" — said Heathcote, watching her countenance, "all this responsibility, and other things as well."

"I was older, a great deal, when I was born," said Anne with a laugh. "It is so different — even to be the eldest makes a difference. I think I shall ask Rose to keep me on as land-agent. She must have some one."

"On your own property; on the land which your mother brought into the family; on what would have been yours but for ——"

"Hu-ush!" said Anne with a prolonged soft utterance, lifting her hand as if to put it on his mouth; and with a smile, "Never say anything of that — it is over — it is all over. I don't mind it now; I am rather glad," she said resolutely, "if it must be faced, and we must talk of it — rather glad that it is for nothing that I have paid the price; without any compensation. I dare say it is unreasonable, but I don't think there is any bitterness in my mind. Don't bring it up ——"

"I will not — God forbid," he said, "bring bitterness to your sweetness — not for anything in the world, Anne; but think, now you are free from your three years' work, now your time will be your own, your hands empty ——"

"Think! why that is what I am thinking all day long; and I don't like it. I will ask Rose to appoint me her land agent."

"I will appoint you mine," he said. "Anne, we have been coming to this moment all these three years. Don't send me away without thinking it over again. Do you remember all that long time ago how I complained that I had been forestalled; that I had not been given a chance? And for two years I have not dared to say a word. But see the change in my life. I have given up all I used to care for. I have thought of nothing but Mount and you — you and Mount. It does not matter which name comes first; it means one thing. Now that you are free, it is not Rose's land-agent but mine that you ought to be. I am not your love," he said, a deep color rising over his face, "but you are mine, Anne. And, though it sounds like blasphemy to say so, love is not everything; life is something; and there is plenty for us to do — together."

His voice broke off, full of emotion, and for a moment or two she could not command hers. Then she said, with a tremor in her tone — "Heathcote — you are poor and I am poor. Two poverties together will not do the old place much good."

"Is that all you know, Anne — still? They will make the old place holy; they will make it the beginning of better things to come. But if it is not possible still to sacrifice those other thoughts — I can wait, dear," he said hurriedly, "I can wait."

Then there was a little pause, full of fate. After a time she answered him clearly, steadily. "There is no question of sacrifice; but wait a little, Heathcote, wait still a little." Then she said with

something that tried to be a laugh, "You are like the rector; you are frightened lest I should be an old maid."

And then in his agitation he uttered a cry of alarm as genuine as the rector, but more practical. "That you shall not be!" he cried, suddenly grasping her arm in both his hands. Anne did not know whether to be amused or offended. But after a while they went on quietly together talking, if not of love, yet of what Heathcote called life — which perhaps was not so very different in the sense in which the word was at present employed.

Two days after was Rose's birthday. Mr. Loseby came over in great state from Hunston, and the friends of the family were all gathered early, the Ashleys and Heathcote coming to luncheon, with Fanny Woodhead and her sister, while a great party was to assemble in the evening. Rose herself, oddly enough, had resisted this party, and done everything she could against it, which her mother had set down to simple perversity, with much reason on her side. "Of course we must have a party," Mrs. Mountford said. "Could anything be more ridiculous? A coming of age and no rejoicing! We should have had a party under any circumstances, even if you had not been so important a person." Rose cried when the invitations were sent out. There were traces of tears and a feverish agitation about her as the days went on. Two or three times she was found in close conversation with Mr. Loseby, and once or twice he had the look of urging something upon her which she resisted. Mrs. Mountford thought she knew all about this. It was no doubt his constant appeal about the provision to be made for Anne. This was a point upon which the sentiments of Rose's mother had undergone several changes. At one time she had been very willing that a division of the property should take place, not, perhaps, a quite equal division, but sufficiently so to content the world, and give everybody the impression that Rose had "behaved very handsomely;" but at another time it had appeared to her that to settle upon Anne the five hundred a year which had been her allowance as the guardian of her sister's interests, would be a very sufficient provision. She had, as she thought, kept herself aloof from these discussions latterly, declaring that she would not influence her daughter's mind — that Rose must decide for herself. And this, no doubt, was the subject upon which Mr. Loseby dwelt with so much insistence. Mrs. Mountford did not hesitate to say that she had no patience with him. "I suppose it is always the same subject," she said. "My darling child, I won't interfere. You must consult your own heart, which will be your best guide. I might be biased, and I have made up my mind not to interfere." Rose was excited and impatient, and would scarcely listen to her mother. "I wish nobody would interfere," she cried; "I wish they would leave us alone, and let us settle it our own way."

At last the all-important day arrived. The bells were rung in the little church at Lilford very early, and woke Rose with a sound of congratulation, to a day which was as bright as her life, full of sunshine and freshness, the sky all blue and shining, the country gay with its autumn robes, every tree in a holiday dress. Presents poured in upon her on all sides. All her friends, far and near, had remembered, even those who were out of the way, too far off to be invited for the evening festivities, what a great day it was in Rose's life. But she herself did not present the same peaceful and brilliant aspect. Mrs. Worth had not this time been successful about her dress. She was in a flutter of many ribbons as happened to be the fashion of the moment, and her round and blooming face was full of agitation, quite uncongenial to its character. There were lines of anxiety in her soft forehead, and a hot feverish flush upon her cheeks. When the Ashleys arrived they were called into the library where the family had assembled — a large sunny room filled at one end with a great bow-window, opening upon the lawn, which was the favorite morning-room of the family. At the upper end, at the big writing-table which was generally Anne's throne of serious occupation, both the sisters were seated with Mr. Loseby and his blue bag. Mr. Loseby had been going over his accounts, and Anne had brought her big books, while Rose between them, like a poor little boat bobbing up and down helplessly on this troubled sea of business, gave an agitated attention to all they said to her. Mrs. Mountford sat at the nearest window with her worsted work, as usual counting her stitches, and doing her best to look calm and at her ease, though there was a throb of anxiety which she did not understand in her mind, for what was there to be anxious about? The strangers felt themselves out of place at this serious moment, all except the old rector, whose interest was so strong and

genuine that he went up quite naturally to the table, and drew his chair toward it, as if he had a right to know all about it. Heathcote Mountford stood against the wall, near Mrs. Mountford, and made a solemn remark to her now and then about nothing at all, while Charley and Willie stood about against the light in the bow-window, mentally leaning against each other, and wishing themselves a hundred miles away.

The group at the table was a peculiar one: little Rose in the centre, restless, uneasy, a flush on her face, clasping and unclasping her hands, turning helplessly from one to the other; Mr. Loseby's shining bald head stooped over the papers, its polished crown turned toward the company as he ran on in an unbroken stream of explanation and instruction, while Anne on the other side, serene and fair, sat listening with far more attention than her sister. Anne had never looked so much herself since all these troubles arose. Her countenance was tranquil and shining as the day. She had on (the curate thought) the very same dress of white cashmere, easy and graceful in its long sweeping folds, which she wore at Lady Meadowlands's party; but as that was three years ago, I need not say the gown was not identically the same. A great quietness was in Anne's mind. She was pleased, for one thing, with the approbation she had received. Mr. Loseby had declared that her books were kept as no clerk in his office could have kept them. Perhaps this was exaggerated praise, and bookkeeping is not a heroic gift, but yet the approbation pleased her. And she had executed her father's trust. Whatever might be the next step in her career, this, at least, was well ended, and peace was in her face and her heart. She made a little sign of salutation to Charley and Willie as they came in, smiling at them with the ease that befitted their fraternal relations. A soft repose was about her. Her time of probation, her lonely work, was over. Was there now, perhaps, a brighter epoch, a happier life to begin?

But Rose was neither happy nor serene; her hot hands kept on a perpetual manœuvring, her face grew more and more painfully red, her ribbons fluttered with the nervous trembling in her — now and then the light seemed to fail from her eyes. She could scarcely contain herself while Mr. Loseby's voice went on. Rose scarcely knew what she wanted or wished. Straight in front of her lay the packet directed in her father's hand to Mr. Loseby, the contents of which she knew, but nobody else knew. Fifty times over she was on the point of covering it with her sleeve, slipping it into her pocket. What was the use of going on with all this farce of making over her fortune to her, if that was to be produced at the end? or was it possible, perhaps, that it was not to be produced? that this nightmare, which had oppressed her all the time, had meant nothing after all? Rose was gradually growing beyond her own control. The room went round and round with her; she saw the figures surrounding her darkly, scarcely knowing who they were. Mr. Loseby's voice running on seemed like an iron screw going through and through her head. If she waited a moment longer everything would be over. She clutched at Anne's arm for something to hold fast by — her hour had come.

They were all roused up in a moment by the interruption of some unusual sound, and suddenly Rose was heard speaking in tones which were sharp and urgent in confused passion. "I don't want to hear any more," she said; "what is the use of it all? Oh, Mr. Loseby, please be quiet for one moment and let me speak! The first thing is to make a new will."

"To make your will — there is plenty of time for that," said the old lawyer, astonished, pushing his spectacles as usual out of his way; while Mrs. Mountford said, with a glance up from her worsted work, "My pet! that is not work for to-day."

"Not my will — but papa's!" she cried. "Mr. Loseby, you know, you have always said I must change the will. Anne is to have the half — I settled it long ago. We are to put it all right. I want Anne to have the half — or nearly the half!" she cried, with momentary hesitation, "before it is too late. Put it all down, and I will sign; the half, or as near the half as —— Quick! I want it all to be settled before it is too late!"

What did she mean by too late? Anne put her arm behind her sister to support her and kissed her with trembling lips. "My Rose!" she cried, "my little sister!" with tears brimming over. Mrs. Mountford threw down all her wools and rushed to her child's side. They all drew close, thinking that "too late" could only mean some fatal impression on the girl's mind that she was going to die.

"Yes, half: half is a great deal!" said Rose, stammering, "nearly half, you know

— I have always meant it. Why should I have all and she none? And she has not married Mr. Douglas — I don't know why. I think — but it hasn't come about — I want everybody to know papa made a mistake; but I give it to her, I give it to her! Mr. Loseby, make a new will, and say that half — or nearly half — is to be for Anne. And oh! please, no more business — that will do for to-day."

She got up and sat down as she was speaking, feverishly. She shook off her mother's hand on her shoulder, gave up her hold upon Anne, drew her hand out of the rector's, who had clasped it, bidding God bless her, with tears running down his old cheeks. She scarcely even submitted to the pressure of Anne's arm, which was round her, and did not seem to understand when her sister spoke. "Rose!" Anne was saying, making an appeal to all the bystanders, "Do you know what she says? She is giving me everything back. Do you hear her — the child! My little Rosie! I don't care — I don't care for the money; but it is everything that she is giving me. What a heart she has! do you hear, do you all hear? — everything!" Anne's voice of surprise and generous joy went to all their hearts.

Mrs. Mountford made an effort to draw Rose toward herself. "There had better be no exaggeration — she said the half — and it is a great thing to do," said the mother thoughtfully. There was nothing to be said against it; still half was a great deal, and even Rose, though almost wild with excitement, felt this too.

"Yes, half — I did not mean all, as Anne seems to think; half is — a great deal! Mr. Loseby, write it all down and I will sign it. Isn't that enough — enough for to-day?"

"Only one thing else," Mr. Loseby said. He put out his hand and took up the letter that was lying innocently among the other papers. "This letter," he said — but he was not allowed to go any further. Rose turned upon him all feverish and excited, and tore it out of his hands. "Anne!" she cried with a gasp, "Anne! I can't hear any more to-day."

"No more, no more," said Anne soothingly; "what do we want more, Mr. Loseby? She is quite right. If you were to secure the crown to me, you could not make me more happy. My little Rose! I am richer than the queen!" Anne cried, her voice breaking. But then, to the astonishment of everybody, Rose burst from her, threw down the letter on the table, and covered her face, with a cry shrill and sharp as if called forth by bodily pain.

"You can read it, if you please," the girl cried; "but if you read it, I will die!"

Mr. Loseby looked at Anne and she at him. Something passed between them in that look, which the others did not understand. A sudden flush of color covered her face. She said softly, "My trust is not over yet. What can it matter to any one but ourselves what is in the letter? We have had business enough for one day."

And Rose did not appear at lunch. She had been overwrought, everybody said. She lay down in a dark room all the afternoon with a great deal of eau de Cologne about, and her mother sitting by. Mrs. Mountford believed in bed, and the pulling down of the blinds. It was a very strange day; after the luncheon, at which the queen of the feast was absent, and no one knew what to say, the familiar guests walked about the grounds for a little, not knowing what to think, and then judiciously took themselves away till the evening, while Mr. Loseby disappeared with Anne, and Mrs. Mountford soothed her daughter. In the evening Rose appeared in a very pretty dress, though with pale cheeks. Anne, who was far more serious now than she had been in the morning, kissed her little sister tenderly, but they did not say anything to each other. Neither from that time to this has the subject ever been mentioned by one to the other. The money was divided exactly between them, and Anne gave no explanations even to her most intimate friends. Whether it was Rose who shared with her, or she with Rose, nobody knew. The news stole out, and for a little while everybody celebrated Rose to the echo; but then another whisper got abroad, and no one knew what to think. As a matter of fact, however, Mr. Mountford's two daughters divided everything he left behind. The only indication Anne ever received that the facts of the case had oozed out beyond the circle of the family, was in the following strange letter, which she received some time after, when her approaching marriage to Heathcote Mountford, of Mount, was made known.

"You will be surprised to receive a letter from me. Perhaps it is an impertinence on my part to write. But I will never forget the past, though I may take

it for granted that you have done so. Your father's letter, which I hear was read on your sister's birthday, will explain many things to you and, perhaps, myself among the many. I do not pretend that I was aware of it, but I may say that I divined it; and divining it, what but one thing in the face of all misconstructions, remained for me to do? Perhaps you will understand me and do me a little justice now. Pardon me, at least, for having troubled even so small a portion of your life. I try to rejoice that it has been but a small portion. In mine you stand where you always did. The altar may be veiled and the worshipper say his litanies unheard. He is a non-juror, and his rites are licensed by no authority, civil or sacred; nor can he sing mass for any new king. Yet in darkness and silence and humiliation, for your welfare, happiness, and prosperity does ever pray — C. D."

Anne was moved by this letter more than it deserved, and wondered if, perhaps —— But it did not shake her happiness as, possibly, it was intended to do.

And then followed one of the most remarkable events in this story. Rose, who had always been more or less worldly-minded, and who would never have hesitated to say that to better yourself was the most legitimate object in life — Rose, no longer a great heiress, but a little person with a very good fortune, and quite capable of making what she, herself, would have called a good marriage — Rose married Willie Ashley, to the astonishment and consternation of everybody. Mrs. Mountford, though she lives with them and is on the whole fond of her son-in-law, has not even yet got over her surprise. And as for the old rector, it did more than surprise, it bewildered him. A shade of alarm comes over his countenance still, when he speaks of it. "I had nothing to do with it," he is always ready to say. With the curate the feeling is still deeper and more sombre. In the depths of his heart he cannot forgive his brother. That Rose should have been the one to appreciate modest merit and give it its reward, Rose and not her sister — seems like blasphemy to Charley. Nevertheless, there are hopes that Lucy Woodhead, who is growing up a very nice girl and prettier than her sister, may induce even the faithful curate to change the current of his thoughts and ways.

From The Nineteenth Century.

WORRY.

When a strong and active mind breaks down suddenly, in the midst of business, it is worn out by worry rather than overwork. Brain-labor may be too severe, or ordinary exercise prolonged until it produces serious exhaustion; but the mere draining of resources, however inexpedient, is not disease, and seldom inflicts permanent injury. A temporary collapse of the mental powers may be caused by excessive or too continuous exertion, just as a surface well may be emptied by pumping it out more rapidly than it is refilled, but the apparatus is not thereby disorganized, and time will remedy the defect. When rest is not followed by recovery, the recuperative faculty itself, an integral part of the intellectual organism, must be impaired or disabled. This is not unfrequently the case when the possessor of a worried and weakened brain in vain seeks refuge from the supposed effects of "over-work" in simple idleness. Something more than exhaustion has occurred, and rest alone will not cure the evil. The faculty of repair is not in a condition to restore the equilibrium between potential energy and kinetic force. Divers hypotheses have been suggested to explain this state of matters. The mind has been compared to a muscle overstrained by a too violent effort, or paralyzed by excessive exertion. The two phenomena have little similarity, and no new light is thrown on the nature of mental collapse, by the comparison. Perhaps a closer parallel might be found in the state which ensues when the tension of a muscular contraction is so high that spasm passes into rigidity, and molecular disorganization ensues. Meanwhile, however interesting these speculations may prove to the physiologist, they bring no relief to the sufferer. It is easy to see that a worse evil than simply using up his strength too rapidly has befallen him, but no one knows precisely *what* has happened. To cover the enigma, without solving it, "over-work" is taken to mean more than work *over* the normal, in quantity, quality, and time, but no attempt is made to determine how excess, in either or all of these particulars, can bring about the disability and decrepitude we bewail. It is to the investigation of this mystery attention needs to be directed. If it should be possible to ascertain why a mind previously healthy, and still apparently intact, breaks down instantly and

thoroughly under a strain not exceptionally great, and, collapse having once occurred, recovery follows tardily and is rarely complete, it will probably be within the scope of common sense to draw some practical conclusions as to the prevention, and it may be the cure, of what is in truth becoming a scourge of mental industry already almost decimating the ranks of the army of progress, in every field of intellectual enterprise at home and abroad.

A certain degree of tension is indispensable to the easy and healthful discharge of mental functions. Like the national instrument of Scotland, the mind drones wofully and will discourse most dolorous music, unless an expansive and resilient force within supplies the basis of quickly responsive action. No good, great, or enduring work can be safely accomplished by brain-force without a reserve of strength sufficient to give buoyancy to the exercise, and, if I may so say, rhythm to the operations of the mind. Working at high pressure may be bad, but working at low pressure is incomparably worse. As a matter of experience, a sense of weariness commonly precedes collapse from "over-work;" not mere bodily or nervous fatigue, but a more or less conscious distaste for the business in hand, or perhaps for some other subject of thought or anxiety which obtrudes itself. It is the offensive or irritating burden that breaks the back. Thoroughly agreeable employment, however engrossing, stimulates the recuperative faculty while it taxes the strength, and the supply of nerve-force seldom falls short of the demand. When a feeling of disgust or weariness is not experienced, this may be because the compelling sense of duty has crushed self out of thought. Nevertheless, if the will is not pleasurably excited, if it rules like a martinet without affection or interest, there is no *verve*, and like a complex piece of machinery working with friction and heated bearings, the mind wears itself away and a break-down ensues. Let us look a little closely at this matter.

The part which "a stock of energy" plays in brain-work can scarcely be exaggerated. Reserves are of high moment everywhere in the animal economy, and the reserve of mental force is in a practical sense more important than any other. It may happen that mere strength of mind carries a body with scarcely a vestige of power in reserve through some crisis of extraordinary difficulty, but the mental exploit is full of danger. The residual air in a lung is the basis of the respiratory process; the sustained tension of the smaller arteries transforms the pulsating current of blood thrown into the system by the heart to a continuous circulation; the equilibriated tonicity of opposing muscles gives stability to the apparatus of motion, and renders specific combinations of movement possible. What is true of the physical is also true of the mental constitution; the residual force, the tension, the tonicity, of mind, form the basis of intellectual action. It is not necessary to discuss the relations of mind and matter; even if the mental being is no more than a formulated expression of the physical organism, the continuity is so complete that the same laws govern both. For the purposes of the present argument it is sufficient to assert that, without a reserve of energy, healthy brain-work is impossible. Pain, hunger, anxiety, and a sense of mind-weariness, are the warning tokens of exhaustion extending to the reserves. When these indications are disregarded, or destroyed, as they may be, by stupefying drugs, an inordinate use of stimulants, a strong effort of the will, or the anæsthetic effect of excessive exhaustion, the consumption of energy goes on unobserved. The feats of intellectual or physical strength, the surprising exploits of special sensation and mind-power performed by individuals under the influence of any condition which suspends the sense of pain, weakness, or fatigue, are explained by the circumstance that unsuspected reserves of power and endurance are placed at the disposal of the will. These resources were there before, but jealously guarded by the sensations. Martyrdom is possible under the influence of an overpowering abstraction. Passion may produce a similar immunity from pain, and give ability to endure even self-inflicted injury. The daily experience of lunatic asylums will abundantly attest the truth of this last assertion.

How does all this bear upon the subject? It seems rather to strengthen the position assailed, by showing that "overwork" may exhaust the reserves, thereby arresting the function, and possibly destroying the integrity, of the mental organism. That is undoubtedly the surface view of the case, and it is the popular explanation of what occurs. To controvert the received hypothesis is the object of the present paper. The argument, opposed to the theory of work itself exhausting the stock of energy, may be simply stated thus: the reserves, physi-

cal and mental, are too closely guarded to be invaded by *direct* encroachment. Pain is not suspended by the persistent infliction of injury unless the mechanism of sensation is disabled or destroyed. Hunger does not cease until starvation has assailed the seat of nutrition. The sense of extreme weariness is not allayed by increased activity, but the longing for rest may subside, because it has been stifled by some overwhelming influence. The natural safeguards are so well fitted for their task that neither body nor mind is exposed to the peril of serious exhaustion so long as their functions are duly performed. In brief, over-work is *impossible* so long as the effort made is natural. When energy, of any kind, takes a morbid form of action, some force outside itself must be reacting upon it injuriously; and the seat of the injury, so far as the sinister influence on energy is concerned, will be found in close proximity to the sensation which under normal conditions guards the reserve. The use of stimulants in aid of work is, perhaps, one of the commonest forms of collateral influence suspending the warning sense of exhaustion. When the laborious worker, overcome with fatigue, "rouses" himself with alcohol, coffee, tea, or any other agent which may chance to suit him, he does not add a unit of force to his stock of energy, he simply narcotizes the sense of weariness, and, the guard being drugged, he appropriates the reserve. In like manner, when the dreamer and night-watcher, worn out by sleeplessness, employs opium, chloral, or some other poison to produce the semblance of repose, he stupefies the consciousness of unrest, but, except in cases where it is only a *habit* of sleeplessness, which has been contracted, and, being interrupted, may be broken by temporary recourse to a perilous artifice, the condition is unrelieved. Not unfrequently the warning sense is stifled by the very intensity of the motive power or impulse. Ambition, zeal, love, sometimes fear, will carry a man beyond the bounds set by nature. No matter what suspends the functions of the guard set at the threshold of the reserve, if the residual stock is touched, two consequences ensue — waste and depreciation. It is important to recognize both of these evils. The former is generally perceived, the latter is commonly overlooked. The reserve, as we have seen, plays a double part in the economy; it is a stock in abeyance, and it is the base of every present act. Without a reserve of mental energy the mind can no more continue the healthful exercise of its functions, than a flabby muscle without tonicity can respond to the stimulus of strong volition, and lift a heavy weight or strike a heavy blow.

The cause, or condition, which most commonly exposes the reserve of mental energy to loss and injury is *worry*. The tone and strength of mind are seriously impaired by its wearing influence, and if it continue long enough, they will be destroyed. It sets the organism of thought and feeling vibrating with emotions which are not consonant with the natural liberation of energy in work. The whole machinery is thrown out of gear, and exercise, which would otherwise be pleasurable and innocuous, becomes painful and even destructive. It is easy to see how this must be. The longest note in music, the most steady and persistent ray of light — to use an old-fashioned expression — the tonic muscular contraction, are all, we know, produced by a rapid succession of minute motive impulses or acts, like the explosion and discharge of electricity from alternately connected and separated points in a circuit; in fact, a series of vibrations. Mental energy doubtless takes the same form of development. If a disturbing element is introduced by the obtrusion of some independent source of anxiety, or if, out of the business in hand, the mind makes a discord, confusion ensues, and for the time being harmonious action ceases. Working under these conditions in obedience to the will, the mental organism sustains injury which must be great, and may be lasting. The function of the warning sense is suspended; the reserve is no longer a stock in abeyance, and it ceases to give stability to the mind; the rhythm of the mental forces is interrupted; a crash is always impending, and too often sudden collapse occurs. The point to be made clear is this; overwork is barely possible, and seldom, if ever, happens, while the mind is acting in the way prescribed by its constitution, and in the normal modes of mental exercise. The moment, however, the natural rhythm of work is broken and discord ensues, the mind is like an engine with the safety-valve locked, the steam-gauge falsified, the governing apparatus out of gear; a break-down may occur at any instant. The state pictured is one of worry, and the besetting peril is not depicted in too lurid colors. The victim of worry is ever on the verge of a catastrophe; if he escape, the marvel is not at

his strength of intellect so much as his good fortune. Worry is disorder, however induced, and disorderly work is abhorred by the laws of nature, which leave it wholly without remedy. The energy employed in industry carried on under this condition is lavished in producing a small result, and speedily exhausted. The reserve comes into play very early in the task, and the faculty of recuperation is speedily arrested. Sometimes loss of appetite announces the cessation of nutrition; otherwise the sense of hunger, present in the system, is for a time preternaturally acute, and marks the fact that the demand is occasioned by loss of power to appropriate, instead of any diminution of supply. The effort to work becomes daily more laborious, the task of fixing the attention grows increasingly difficult, thoughts wander, memory fails, the reasoning power is enfeebled; prejudice — the shade of defunct emotion or some past persuasion — takes the place of judgment; physical nerve or brain disturbance may supervene, and the crash will then come suddenly, unexpected by onlookers, perhaps unperceived by the sufferer himself. This is the history of "worry," or disorder produced by mental disquietude and distraction, occasionally by physical disease.

The first practical inference to be deduced from these considerations is that brain-work in the midst of mental worry is carried on in the face of ceaseless peril. Unfortunately work and worry are so closely connected in daily experience that they cannot be wholly separated. Meanwhile the worry of work — that which grows out of the business in hand — is generally a needless, though not always an avoidable evil. In a large proportion of instances this description of disorder is due to the lack of education in brain-work. Men and women, with minds capacious and powerful enough but untrained, attempt feats for which training is indispensable, and, being unprepared, they fail. The utilitarian policy of the age is gradually eliminating from the educationary system many of the special processes by which minds used to be developed. This is, in part at least, why cases of sudden collapse are more numerous now than in years gone by. It is not, as vanity suggests, that the brain-work of to-day is so much greater than that exacted from our predecessors, but we are less well prepared for its performance. The treatment of this form of affection, the breakdown from the worry of work, must be preventive; the sole remedy is the reversal of a policy which substitutes results for processes, knowledge for education. It is a serious cause of discomfiture and sorrow in work that so much of the brain-power expended is necessarily devoted to the removal of extraneous causes of worry. Labor is so fatal to life, because it is so difficult to live. The deadly peril of work in the midst of worry must be confronted, because the disturbing cause can only be got rid of by persistent labor. This is the crux of the difficulty, and in the attempt to cure the evil the struggling mind finds its fate involved in a vicious circle of morbid reactions. Nevertheless, it is the fact that work in the teeth of worry is fraught with peril, and whenever it can be avoided it should be, let the sacrifice cost what it may.

The second deduction must be, that there is no excuse for idleness in the pretence of fear of "over-work." There is some reason to apprehend that the attention recently directed to this alleged cause of mental unsoundness has not been free from a mischievous influence on minds only too ready to take refuge in any excuse for inactivity. If the private asylums of the country were searched for the victims of "over-work," they would nearly all be found to have fallen a prey to "worry," or to that degeneracy which results from lack of purpose in life and steady employment. This is a grave assertion, but it points to an evil it is especially needful to expose. Weak minds drift into dementia with wondrous celerity when they are not carried forward to some goal, it matters little what, by the impulse of a strong motive. The bugbear of "over-work" is, it may be feared, deterring parents and friends from enforcing the need of sedulous industry on the young. The pernicious system of "cram" slays its thousands, because *uneducated*, undeveloped, inelastic intellects are burdened and strained with information adroitly deposited in the memory, as an expert valet packs a portmanteau, with the articles likely to be first wanted on the top. Desultory occupation, mere play with objects of which the true interest is not appreciated, ruins a still larger number; while worry, that bane of brain-work and mental energy, counts its victims by tens of thousands, a holocaust of minds sacrificed to the demon of discord, the foe of happiness, of morality, of success. The enemy takes many shapes and assumes bewildering disguises. Sometimes he comes in like a flood, hurrying

everything before him; with heaps of work to be done in less than adequate time. Now the victim is hurried from task to task with a celerity fatal to sanity. Then he is chained like a galley-slave to some uncongenial labor without respite. Again, a buzz of distracting and irritating mental annoyances seem let loose to distress and distract him. Under each and all of these guises it is *worry* that molests, and, unless he be rescued, will ruin him. Meanwhile, the miseries of "overwork," pure and simple, are few and comparatively insignificant. Those who bewail their infliction most loudly are weak of mind or torpid of brain. Of such lame and maimed mortals we are not now thinking. Their lot may be humiliating or pitiable, as their condition is due to neglect or misfortune; but our concern is with the multitude of strong and able-minded workers who fail at their task. These are the victims not of overwork but of worry, a foe more treacherous and merciless than all besides. The mind-cure for the malady to which "worry" gives rise, and from which so many suffer, is not idleness, or "rest," in the ordinary sense of that term, but orderly and persistent work. The work by which they have been injured has not been excessive, but bad of its kind and badly done. The palsied faculties must be strengthened and incited to healthy nutrition by new activity, at first, perhaps, administered in the form of passive mental movement, and then induced by appropriate stimuli applied to the mind.

J. MORTIMER GRANVILLE.

From Fraser's Magazine.

MARY SCHONEWALD.

A STUDY IN PROPHECY.

CHAPTER V.

Our ruling power drives a pair of steeds; of these horses one
Is beautiful and noble; but the other of an opposite nature.
Our driving, therefore, must be difficult and troublesome. — PHÆDRUS.

IN that drama of which each of us is (to himself) the protagonist, our friends and neighbors act the chorus, pity and counsel us, console or blame, but are not supremely affected by our fate. In Mary's history this *rôle* fell to her father and Mrs. Bodley.

They had never been an intimate household, and — as often happens in such cases — Mary's circumstances were more important to them than her character. For this reason they took her new demeanor as a prophetess very lightly, foreseeing a desirable marriage at the end. As they sat up for Mary one December evening, they naturally amused themselves with discussing the person who kept them waiting, Mrs. Bodley, with a great basket of clothes to mend, on one side of the fire, Lewis Schönewald, with pipe and grog, in the great armchair fronting her. They had been silent for some minutes, when the clock struck.

"Eleven gone!" exclaimed Mrs. Bodley, "and Mary not back yet. And I so tired and moithered, for she has never a moment now to help me in the house; but I must be fagging early and late, mending and making, and cleaning for all, not to say sitting up of a night till she chooses to come home."

"Yes," Schönewald answered, "religion's a tiring thing to a saint's relations; but she'll leave off her prophecies as ladies leave off their accomplishments — when she's married."

"Let's trust that may be soon," rejoined Mrs. Bodley; "not that I would say a word if she took to religion in a respectable way, nor even if she turned Methody. I've known very well-mannered people Methodys; but to go about ranting and prophesying, talking gibberish, and calling it the voice of the Lord, *I* call it no better than blasphemy."

"Ah, well; as to blasphemy, most religions are alike; the difference, I suppose, is in the intention."

"I'm sure I don't know what you mean, Schönewald; but if you wish to say as the poor child don't believe in all her rubbish herself, you're wrong for once, with all your cleverness."

"Yet," he suggested in his most plausible voice, "I fancy we agree, don't we? She would never have taken to prophecy if a certain young parson had not praised the performance."

"She'd go through fire and water to please him, that I do believe," asserted Mrs. Bodley, "and scarcely know as it hurt. And it's only natural she should like to show off a bit before her sweetheart. She always was, you remember, a rare one for showing off."

"Oh, Mary don't surprise me. I think she's a very clever girl, and knows what she's about. It's the believing flocks that are too much for me to comprehend. Not but what it's easy enough to convince a willing mind."

"It only seems the other day," said Mrs. Bodley, continuing her own line of thought, "as she was a little toddle in pinafores as always used to speak to me in German when strangers were in the shop, although she knew for sure I didn't understand a word."

"Fifteen years ago now," said Schönewald.

"Ay," she went on, "what a trouble she was, to be sure! She never would be led nor said by any one; always in the wars she was, and never would own as she was naughty. Well I mind her fallinp down in the mud and dirtying her new frock, and sticking to it, for all I could do or say, as it was clean."

"She sees what she wishes," answered he; "she has the feminine temperament strongly developed."

"Feminine fiddlesticks!" interrupted Mrs. Bodley. "Her poor dear mother was just the same. A good husband is all she wants — and why that young man don't speak out is more than I can fathom. If you was a diligent father, Schönewald, you'd ask him what he means by it."

"What he means is clear enough," he answered. "Slow and sure. She's too much of an angel, he thinks, to be won in a canter. Most of us think the same when we're first in love."

"You men are all alike," said she; "not one of you has the pluck to make himself disagreeable except for his own pleasure."

"A failing we don't impute to the fair sex" — and he bowed with a gallant air that sat queerly on his wrinkled face and crooked figure. Then he went on, "But, seriously, the child is late. Go to bed, missis, and I'll sit up for her."

While she was gathering her things together, fastening cupboards, and locking doors, the bell rang. Schönewald answered it, and admitted two smiling but abashed young people.

"I must beg your pardon for keeping you up so late, Mr. Schönewald. I will go now. I will come and speak to you to-morrow." It was Andrew Home that spoke, with some confusion or excitement in his manner.

"Won't you come in, sir?" said Schönewald, looking very amiable.

"Thank you, no. I will not come in to-night. Go in, Mary, dearest, from the draught. But to-morrow, early, I will come. I have a great favor to ask of you — a trust, a treasure to beg you confide to me. I know, I know how little I deserve it; but it shall be the aim of my life to make her happy, to guide and help her."

"Well, sir," answered Schönewald, unable to repress a grin, "I don't think there's much need of your asking it again to-morrow morning. I take it it's my daughter Mary that you want. She's a good girl, and a pretty girl, and one that any gentleman might be proud of. May she make you half as happy, sir, as she's made her poor old father, and you'll not regret your choice. And may my blessing go with her."

He paused, confused by an emotion that was not wholly insincere — a man whom much grinding in the mills of the world had worn and blurred to an habitual unfeeling not natural to him. He thought, looking after Andrew's retreating figure, that his dead wife would like to know of this; that such a piece of good fortune would be a proof to her that the girl had been well looked after in her absence, more convincing than useless tendernesses.

He went in and sat by the cold hearth. He wondered a little sadly why his daughter did not come to kiss him and tell him of her engagement, shyly, with her arms about his neck; then, for he was seldom unjust, he owned that he had never encouraged her in such caresses.

He felt old and loveless. His longing for his dead wife, restrained for many years by patience, hardness, and false content, had gained from this new emotion a force that shattered them; as the seas off Holland, swelled with the autumn rains, wash down the dams that hold them back and flood the harvest fields. "Mary, Mary," he whispered; but it was his wife that he called. Might he but see for a moment the face he never could forget nor ever quite remember! In vain he prayed; he knew it was in vain; yet, unbeliever, scoffer as he was, he felt she recognized the bitterness of his regret.

As he sat thus, thinking sadly of his dead love, he leaned his head against the high back of his chair and clearer visions came to him in the darkness. But no thought nor remembrance of the sleeping girl up-stairs. As for Mary, she slept sweetly, with a soft smile, dreaming of her lover. When she awoke, she wondered how she should ever realize her great happiness. Everything she had wished for was hers. The gift most desired of all — the praise of those she honored, the love of the man she loved. She had never even dreamed of so much happiness. Well for her had she never known

more than the golden rind of her Dead Sea apples.

For after that first morning she was not very happy. Doubts, how wakened she never knew, had begun to assail her as to the reality of her mission. She spent her days in an eager excited fashion, as though she dreaded to leave much time for thought. She would not speak, even to her lover, of her prophecies any more. Yet to doubt seemed to her a criminal yielding to temptation; not only that, a punishment that must take every gift from life that made it worth living. If she were no prophetess — what gipsy fortune-teller were more despicable than she? The thought was too much to bear. She shut it out from her mind, with a passionate voluntary defiance.

It was easy to see she was not happy. But her wedding-day was fixed for April, when the hundred days that were to elapse before the baptism of fire should have been accomplished; and Mrs. Bodley, who was the only woman in the world who cared for Mary merely as for another woman, put down her evident uneasiness to the restlessness that most girls feel on the eve of marriage.

Mary kept her troubles to herself. Once, indeed, she had ventured in her greatest doubt and misery to mention them to Andrew Home.

They had been speaking of the nearing Pentecost. "What shall we do if, after all, it should not happen, not come true?" she had said.

"Hush, dearest," he had answered, "it must come true; it is wicked to doubt it. What God has spoken must be true."

"But I mean," said Mary wretchedly, faltering, "I mean, you know, supposing it was not God that spoke."

"Not God that spoke! Oh, Mary, do you remember that false spirits are of the enemy, accursed devils? that lying prophets are a shame and an abomination to the Lord? Mary, you must not brood on such terrible things. Your goodness and humility are not good any more, but blasphemous, when you distrust, not yourself, but the voice of God."

This was little comfort to poor Mary. She thought of going to Mr. Irving and begging him to advise her, but her courage failed her when she remembered all that such a step involved. As the day appointed for the new Pentecost drew near, she made up her mind to wait and stake all upon its issue.

Anxiously, in hope and dread, she watched the looked-for morning dawn.

It was a dark morning; the air was moist and close; the rain fell down in fine, straight lines. Yet at an early hour the church was thronged, for who could say at what moment the miracle might come to pass? All prayed in reverent silence. Mary kneeling by the altar poured out her very soul in tears of anguish and entreaty. Surely the Spirit would not desert her now. Hour after hour went by, unblessed, silent. At length some one spoke aloud and prayed, others followed; a great cry of beseeching went up to heaven. Noon came and went, but brought no answer with it; the shadows lengthened, still they prayed. Evening fell. The appointed day was gone, the baptism withheld.

The minister rose and blessed the congregation. Mary felt his pitying face like a reproach. Doubting, grieving, impatient, the worshippers left the church. Yet there was no soul among them shaken by such a storm of doubt and terror as that which broke in fury upon the lonely, kneeling prophetess.

CHAPTER VI.

χρήσειν ἔοικεν ἀμφὶ τῶν αὐτῆς κακῶν.
AGAMEMNON.

THE next few days passed to Mary Schönewald like a troubled dream in sickness, in which we are dimly conscious of the world to which we would return, yet cannot free ourselves from the tyranny of shadows.

Nearly a week of such days had passed, dreary and uneventful, and still Andrew Home had not called in Endell Street since the terrible day of failure.

Mary made a thousand excuses to be always in the shop at five o'clock. She longed to see him, to explain, to give him up if needs be, but at least to see him first.

Mrs. Bodley and her father let her have her way and pretended not to notice her; this was a trouble they could understand and pardon. They had great use for their patience, for during this time Mary was a moody, easily irritated companion. She shrank from the daily affairs of the little household, and sat up-stairs in her room aimlessly watching the fall of the rain on the roof.

It was a late and foggy spring, with fever in the thick air and rumors of the spread of cholera. Strong, happy people even felt the depressing influence of that time. Mary thought that winter had settled down upon the world forever. Her

thoughts through the weary days were that Andrew did not come; all her dreams in the restless nights that he might come to-morrow. She could think of nothing else; not even of her own failure. This she scarcely realized as yet, as a certainty; for her co-religionists were eager in assuring her of the reality and permanence of her gift.

Mr. Irving had seen her and had tried to encourage her, bidding her walk more by faith and less by sight, and all the congregation found fresh interpretations of her message, with the persistency of believers who will not be undeceived. Still Andrew did not come, and Mary felt his distrust more keenly than their assurances.

The week dragged on; but when Sunday waned to evening, and still he kept away, Mrs. Bodley felt that the time had arrived for her to interfere. They were to be married in little more than a week, and she could make nothing of such neglect. She looked for Mary and found her at last, sitting on a packing-case in the darkened storeroom, leaning her head against a pile of books, her arms flung down in an attitude of despair, the tears welling from under closed lids and coursing down her pale, childish face.

"Why, Mary, what are you here for?" said Mrs. Bodley.

Mary started, and tried to look busy and natural.

"I came to unpack this case from Bristol," she replied.

Mrs. Bodley, like many other people, showed her pity, even when it was heartfelt, by a manner of scolding remonstrance. She began in a complaining voice, of which Mary felt the injustice and missed the tenderness.

"Child, why are you so hard and unkéd,* screwing in your lips with your misery behind them, gloomy and quiet? Better make a clean breast on it, my dear. There's use in keeping oneself to oneself if one's old, and has troubles bound to last one's life long. But you, Mary, your wedding day's next week, and all your life before you. If you've fallen out with your young man ——"

"Leave me alone — oh, leave me alone!" cried Mary.

"Hoighty toighty! and what's the use, I should like to know, of my being a widow woman, and having experience of my own, if a chit of a girl like you won't take a word in season? But you never would be said, Mary, else I could help you."

Mary clenched her hands very hard, and tried not to hear.

"Now, my dear," Mrs. Bodley went on, changing her complaining tone for one of persuasion, "be guided for once; ten to one you were in the wrong. Girls are so franzy, and you've been but fradgetty-tempered of late to us all; and men won't stand that sort of nonsense. Write a little letter to your young man, and tell him you're sorry, and as you hope he'll overlook it and make friends."

Mary shook her head. The idea, it is true, of writing to Andrew had come into her mind, and had seemed good until Mrs. Bodley suggested it. Now it seemed only worthy of that stout, undignified woman, whose broad Midland accent somehow (it seemed to Mary in her irritated temper) coarsened the sense of the words she used. Mrs. Bodley misunderstood her silence.

"Well, well," she said: "girls should be coy, to be sure; I won't blame you if you don't like to demean yourself by writing yourself. Mary, I tell you what I'll do for you. I'll write to him unbeknown as it were, and ask him to tea, and say as you'll be glad to see him."

She stopped for Mary's answer, her broad face beaming with good-humored smiles.

"If you do," cried the girl, starting up, "I'll never forgive you! I'll never speak a word to you again!" and she dashed out of the shop, up the staircase, into her own little room. The bang of the door, the creaking slide of the little-used bolt, could be heard down-stairs, where the astonished widow stood with uplifted hands.

"Well!" she cried, "if this is religion; to be sure ——"

Up-stairs Mary was sobbing in passionate contrition. She, too, felt that her religion had not helped her in her daily life; wondered unhappily why, when she wished so much to be good, she should be wicked — misunderstood — a failure — alienate from God. In the midst of her tears the tremor seized her that always preceded prophecy. God, then, had not forgotten her, she thought, with chastened exultation. Still she was to be his servant, his beloved. During the week she had received a message, and now she took the renewal of ecstasy as a pledge of the continued favor of Heaven. At last a way would be shown her out of her difficulties; truth should be made divinely

* A Warwickshire word meaning unmanageable, unnatural, awkward, uncouth, horrible, and in fact almost everything one need use an adjective for.

clear to her soul. She abandoned herself wholly to the course of inspiration. Life seemed suspended in her, as without thought or emotion she waited for the utterance of the word. The final rapture came. Now God shall speak from Sinai. "Andrew! Andrew!" rang out the terrible voice.

CHAPTER VII.

Occasions do not make a man frail, but they show what he is. — IMITATION OF CHRIST.

DURING that night Mary lay still, stupefied with horror. It was plain that all along she had deceived herself. She had no doubt about her future course. She did not think about it or decide; indeed, the intolerable responsibility seemed partly lifted from her shoulders.

When she roused herself in the first grey of the morning, she dressed herself quickly, tied on her cloak and bonnet, and went out in search of Mr. Irving, to make, if he should think it necessary, a public recantation.

The service was over when she reached Regent's Square; but it is not far to walk thence to Judd Place, where Mr. Irving lived.

Mary came to the house; the front door was open; there was some commotion in the hall. Standing by the door she saw the minister kiss his wife and children, and bid them all good-bye. Then, as he was about to leave the house, a man came out of the sitting-room and joined him. She felt, rather than saw, that this was Andrew Home.

At that moment she realized for the first time the strength of the trial before her. Her heart revolted against it; it seemed intolerable. "O my Father," she prayed, using unconsciously the familiar, holy phrase, "if it be possible let this cup pass from me."

It was not to be. Already the two friends came down the steps, talking earnestly. Mary stepped forward.

"Please, minister," she said, "I have a word to say to you."

"Mary!" exclaimed her lover, pale at the sight of her. "You must not stay here. Go home; go home and pray God to forgive you and all of us, and to renew his grace. Go home; we are on our way to London Wall, where the minister is to be tried to-day before the presbyters."

He waved her away, excitedly anxious, it seemed to Mary, to be rid of her. But she stood firm, looking at Mr. Irving.

"Nevertheless," said the minister, "though the time be short, if my sister have need of me, we can tarry for a while."

The gentle speech pierced Mary to the heart. She had not thought before how deeply her conduct must affect others beside herself. Now she remembered to have heard that Mr. Irving was on trial for having permitted the prophets to speak in the church. She felt it the cruelest part of her punishment thus to desert him in the hour of need, being herself the cause of his blameworthiness.

"Let me walk with you," she said; "I can tell you as we go. It will be easier than standing still."

They walked on a little way in silence.

"What is it, my sister?" the minister said at length.

"Oh," cried Mary, "forgive me, Mr. Irving, but I have deceived myself and all of you. There is no Spirit; we are all deceived. Oh, I am so miserable; and it is you that will suffer for my fault; you, that never were wrong. Is there nothing — nothing I can do to make it be as if it had not happened?"

"Hush, hush!" said Mr. Irving, "you know not what you say. Child! the gift and calling of God are without repentance."

"It is I," cried Andrew Home, "that have driven her to despair. Poor Mary! poor love! I have been too hard with you. But it was being harder to myself. Forgive me, dear, and repent, and all will yet go well."

"My dear child," went on the minister — for Mary was quite silent still, with no comfort in her blank eyes, and no sign in her miserable face that their words had reached her — "do not be so discouraged with one failure. Your faith should not be shaken for the withholding of a sign. There is a confidence in God which goes far beyond the answer of the Spirit. I would you had it."

"But — but" — faltered Mary, "I have not told you yet. Oh, how I wish you could say it for me!"

"Take courage, dear sister," he replied; "do not despair. The ways of God are not as our ways, neither his thoughts our thoughts; nor do we know in what manner his baptism may have been given us unperceived."

"Oh, it is not that" — broke in Mary — "if it were only that! How can I tell you? I did not mean to be wicked. Ah! no, indeed; but now I know we were all deluded."

"Will you not hear me, Mary?" said her

lover. "Why are you grown so wilful? Believe me, it is now that you are deluded; now that you have let your own despair, or pride, or doubt, grow stronger than the will of God."

"If only I did not know," said she, "how gladly I would believe you."

"But how do you think you know? tell us your temptation," said the minister.

Poor Mary flushed all over with pain and shame, but she tried to forget herself, and make what restitution of truth was possible.

"I was praying this morning," she began in a dull, toneless voice, "when the old feeling seized me. It had never seemed so perfect an entrance into Christ before." (She stopped a moment and shuddered.) "I waited for the word, thinking it would be counsel. But when the voice spoke — Mr. Home, it was your name I said."

The two men looked at each other; neither had a thought to spare for Mary. The meaning of her speech was terribly clear.

After a while Mr. Irving turned towards her. He laid his hand on her head and blessed her. "God comfort you," he said. Then turning to his friend: "Come, Andrew, there is not time to lose. But faith is hard — faith is very hard."

Andrew would not go.

"Mary, Mary!" he cried out in a passionate attempt of disbelief. "It is not yet too late. Repent, own your error, will you deny the voice of the Holy Ghost? Oh, my love, speak one word of reassurance. Beware lest God be angry with you, as it is written, 'Because ye have made the heart of the righteous sad, whom I have not made sad.' Will you desert him in the hour of need? One word, Mary! Oh, Mary, Mary, why are you silent?"

In his excitement he had come close up to her; he held both her hands in his, and looked with searching appeal in her face. It was hard with his touch upon her, his voice in her ears, to resist him; and her own heart seconded his entreaty. One word! what would it not bring back?

"Does he not know," she wondered, "how I long to speak it?"

Yet she had strength to keep silence.

He dashed her away from him and turned and left her, with such a look as Anthony might have given to a beautiful but hell-born temptress.

"Apostate!" he cried; and all the air seemed full of the word, unfit to breathe.

Mary stood looking after the two men, till they were out of sight. Then she crept into a neighboring archway; leaning against the wall, she covered her face with her hand and wept the few painful tears of a broken heart.

CHAPTER VIII.

Therefore night shall be unto you that ye shall not have a vision; it shall be dark unto you, that ye shall not divine; and the sun shall go down over the prophets, and the day shall be dark over them.
MICAH.

MARY walked home; and that day went as other days had gone. There seemed a mockery in this unaltered form of life, the spirit being dead. The daily meals, the little duties, the long regrets, divided the hours now as before.

Happily she was left a good deal to herself; her father was busy in the shop, arranging a new lot of books, from morning till late at night. Mrs. Bodley, not unnaturally, was offended with Mary, and did not speak much to her.

After supper on the second night, the door-bell rang. Mrs. Bodley came into the kitchen where Mary was ironing, and gave her a letter. "I'm so glad, my dear," she said.

The girl looked at it, and saw the address was in Andrew's writing. She sighed, kissed Mrs. Bodley, and took the letter up-stairs.

She did not break the seal at once. First she knelt down by her bedside and prayed for a long time, with a childlike trust that her appeal would turn all the words in the letter to kindness, as a miracle changed the loaves of St. Elizabeth to roses.

Then she got up and took it to the window, for the feeble sunlight was fading already from the west.

This is what she read.

DEAR MARY, — Still so dear to me, although my conscience tells me that we must part. I cannot cast in my lot with one whom the approach of danger has made apostate to the truth of which she herself has been a witness. These are hard words; but my heart is not hard. I dare not see you, knowing it to be for the last time. I dare not look on your face and acknowledge that the soul I used to love in it is lost. Dear Mary, let it not be so. We must part; our love is shattered, but save your soul.

Believe me, you are doing very wrong in denying the voice of the Spirit. The love of display, which now I see to have been always your besetting sin, tempted you once to confound your wishes with the voice of God. But

be not more grievously deluded in denying the true utterance.

I could weep, Mary, when I think from what a state of grace you are fallen. But the mercies of God are infinite, and his loving kindness everlasting. Pray to him that he may forgive the sin you have sinned against him, as I pray that you may be restored to the simplicity which is in Christ. With sincerest wishes for the eternal well-being of your soul, believe me, your true friend,

ANDREW HOME.

A cord seemed to break in Mary's brain. She read the cold little letter over and over, trying to find a tender meaning in each unpardoning phrase. Then, with a great sob, she owned that he could never have loved her. It seemed strange to her that she did not feel more acutely. There were no tears in the aching eyes that watched the sprouting poplar, its smallest branches as still in the heavy, foggy air, as carven fretwork on a ground of greenish jade; she looked quietly out at the low, yellow sky, the fog-blackened houses.

She must have sat a long while thus; for the first thing she noticed was Mrs. Bodley's step as she came up the stairs to bed. "Good-night, Mary!" she called through the curtain.

Mary did not stir; at last some fibre in her heart seemed to wake. Was it never that she should see him again? Every happy moment she had spent with him awoke in her memory, like a mocking dream. She thought she would go mad if she did not at once and by her own act place some decisive barrier between that past and this present.

She rose quickly and drew back the curtain. Mrs. Bodley lay asleep in unconscious rest. Mary looked at her a little while and sighed, but did not wake her; with a tenderness strange to herself she crept away, still burdened with her secret.

After a while she heard her father stirring below. She went down to him, taking great care to be quiet. He was outside the shop putting up the shutters. The night was so thick and dark that he neither saw nor heard her till she put her hand on his arm.

"Why, child, I thought you were a ghost," he said.

And indeed she was strangely pale.

"What is it?" he asked.

Mary looked vaguely before her, twisting her fingers in and out.

"I came to tell you. And now I don't quite remember," she replied.

"What nonsense are you up to now?" said her father, "disturbing a man in his work to tell him such rubbish."

"Something has happened, all the same," insisted Mary, putting her hand to her head; "though I can't say it, I feel it here."

"*I* know what's happened," Schönewald replied, "and that is that you'll fret yourself into a fever after that fool of a parson."

"Andrew?" said Mary, "oh, that is it. Let me think."

"Have you and he been quarrelling?" suggested Schönewald.

"He and I? you must not say that any more. He is my true friend — no more, nothing more."

"What d'ye mean?" said he roughly; "do you mean to say the engagement's broken off?"

"Andrew, Andrew!" said Mary, with a little shiver. "Oh, is God very angry with me, I wonder?"

"Confound the blackguard," burst out Schönewald. "He thinks my daughter good enough to make a useless fool of, does he? but not to marry and provide for. I'll punish him."

"No, no," said Mary, "punish me; God will punish me. The false prophet shall die! Andrew said that."

"False prophet? What are you after, child? Have they found you out?"

"Accursed; a shame to God," she muttered, as if striving to recall a phrase which had no reference to herself.

"What have you done?" he asked, peering at her with curious eyes. He had, perhaps, never felt so angry in his life. All his schemes ruined, and for no reason that he could find.

"Do you mean to say that they've found out your tomfoolery was lies?" he went on. "I could have told them that all along."

"I don't understand," said Mary, with a bewildered glance. "Don't you believe in me, father? I am a prophetess, like Deborah. Oh no, oh no! All deceit; all lies; all ruin!"

"I tell you what I do believe," said her father crossly, "and that's that you didn't stick at a story or two to catch your young parson, and I wouldn't have blamed you if you'd played your hand wisely, but you've made a false move and lost the game."

"Lost," she cried; "yes, that is true. I am lost, lost, lost! Oh God, I am lost, find me!" and flinging up her arms, she

darted wildly away into the black, impenetrable night, into the thick darkness of the stifling fog.

Her father stood amazed for a moment. The girl must have lost her senses. Then he rushed into the fog in search of her, but his seeking was in vain.

Meanwhile Mary ran on through the darkness, with stumbling steps, anywhere, away from home, beyond the reach of remembrance.

Where was the God she had blasphemed, the God who must condemn her, who alone could pity her and understand? She ran with outstretched arms, meaning to fly to his knees for shelter, to bathe his feet with her tears, like another penitent Mary of old, who was a sinner.

She did not hear the shouts of the angry drivers, nor heed, though once she struck her brow against a lamp-post till blood streamed from the wound, and more than once she stumbled at the kerb and fell prone to the earth. Faint and weary, she sped on, without will or purpose, but her feet, used to one journey, carried her along the familiar road to Regent's Square. Looming before her stood the church, solemn and lonely in the night. Mary crept into the porch, scarcely knowing what she did. She had neither cloak nor bonnet, and wrapped her skirt round head and shoulders to shield her from the clammy cold.

Thus covered, she huddled against the wall, close, closer, as though the stones were holy, and could keep bad dreams away.

Ah, worse than any vision was the absolute blank, within, without. No longer she remembered what crime obscured her soul with its awful shadow. Fearful, unrecognizable, it oppressed her like those vague evils which frighten children in the dark. She could no more define the cause of her anguish than pierce with sight the thickening blackness that surrounded her.

For now the fog had rolled in a solid flood through square and street, palpable and deadly, foul with poisonous effluvia that could not rise and escape. The open porch where Mary crouched had no asylum from its reach. It hung like a weight on her eyes, and wrapped her round like lead; there was no life in its air.

As the night wore on, the fog seemed to stifle her, her limbs grew numb and heavy; her sorrows troubled her no longer; she sank into inert repose.

"Oh, merciful heaven," she thought, "for even such as I am is there rest?"

CHAPTER IX.

Ah! judge her gently, who so deeply loved;
Her, who in reason's spite, yet without crime,
Was in a trance of passion thus removed.
LAODAMIA.

EARLY the next morning Andrew Home and Mr. Irving were walking towards the church. Their conversation had been of yesterday's trial, until the minister, whose troubles never made him unmindful of the need of others, suddenly said, —

"By-the-bye, what has become of that poor little Miss Schönewald? I have thought of her a good deal. Poor child, she outreaches me in sorrow."

"She has brought it on herself," Andrew replied curtly.

"That does not lighten it. Shame, doubt, the consciousness of sin, such personal troubles are worse than abandonment and estrangement even. And I fear we have let her feel herself abandoned. She is your intended, is she not? You must be very gentle with her."

"I am not engaged to her now," said Andrew.

"Dear friend," said the minister, "I trust you have done nothing in haste?"

"No. It was hard for both, but it was for the best. There was too wide a division, of late, between our souls for love even to bridge, and I fear I did not love her. I loved my own 'fancy,' not Mary Schönewald."

There was too much self-reproach in his voice for Mr. Irving to make a blaming answer, and he could make no other. So they went on some way in silence.

As they turned the corner they saw a little crowd before the church door. At first they thought that some specially sympathetic members of the congregation had come thus early to gain the first news of the trial; but on coming nearer they perceived that the loiterers were of a different class; some workmen going to their labors, a constable, an Irish huckstress with a basket of oranges. They stood in a knot at the entrance to the porch; above their whispers rose the authoritative voice of the constable.

"The second the fog killed last night," they heard him saying; "first a cabby, now this here young woman. Exposure, as they calls it. She doesn't look like a tramp neither."

And he bent down, curiously.

"She's only a girleen," said the apple-woman, "but very tired-looking for one so young. The Lord's taken her out of pain and given her a happy death. There's no fear in her face."

She knelt down by the corpse, telling her beads. The change in her position showed a glimpse of the scene within.

The two friends hastened. Suddenly Andrew Home sped on, and Mr. Irving, from behind, saw him fling himself upon his knees and take the slender little body into his arms.

"Were you acquainted with the deceased, sir?" said the constable respectfully, taking out his notebook.

"Sure yer honor's come too late," said the orange-woman; "you can do no more than another now; pray Mary and the blessed saints to rest her soul."

He spoke no word to either; he did not hear them.

The minister, coming up a moment later, stooped and saw at rest upon her lover's shoulder the tired, peaceful face of Mary Schönewald.

He sent the people away, quietly; but Andrew Home knelt on, and did not stir. Bitterly his heart reproached him for every cruel or thoughtless word gone by, and never again to be unsaid. It was his punishment to recall them thus, holding in his arms the dead body of the woman who had loved him; whom then, for the first time, he truly loved.

But Mary Schönewald could never know it.

A. MARY F. ROBINSON.

Note. — Although so well-known a man as Edward Irving has been introduced into this story, it is purely a work of fiction. But though fictitious it is based on a very careful and detailed study of the history of Irving and his contemporaries. — ED.

From Chambers' Journal.

MY TROUBLES IN RUSSIA.

TROUBLE THE THIRD.

BESIDES the German pastor, there are with me in the carriage, his wife and a German spinster; and we three become very friendly over the recital of my calamities. Many are the tales of fraudulent officials, of bribery and chicanery, which pass from mouth to mouth. The time passes so quickly and pleasantly, that I am surprised when we slacken speed, and my fellow-passengers collect their belongings. The pastor and his wife do not proceed to Dorpat; but the spinster, as she informs me, is going there to visit friends; so we unprotected females determine to keep together. We take a considerable time to gather up our scattered effects; for the spinster has bandboxes, several baskets and bundles, which I hand to her out of the carriage. I wonder how she managed before she met me, for we are both laden breast-high as we enter the station-house. Here we are seen by the pastor, who is drinking tea at the refreshment counter. He leaves his cup, and comes hastily towards us. "Ladies, I would advise you to hasten, or you will lose your chance of seats in the omnibus which runs between the station and the boat. If you do not succeed in catching it, I fear you cannot get on to Dorpat to-day; the boat waits for no one."

The spinster at once drops several parcels, and loses the immediate possession of her mental faculties. "Where? Which? What?" she gasps.

The pastor has picked up the scattered parcels, and strides to the door. "This way!" he says. "You may catch it yet. They have carried your luggage through; it will be outside."

There stand our boxes, and also the omnibus, but crammed full of sweltering mortals; some standing with stooping heads, some sitting, huddled together, but all triumphant.

"I must go with this 'bus!" screams the spinster frantically, rushing to the step.

The conductor waves her off. "Cannot — too late — no room!" he cries. The driver cracks his whip, and the omnibus moves away in a cloud of choking white dust. The spinster looks wildly after it, and runs a few steps; then a bundle falls, and she is herself again, and relinquishes the pursuit. I stand looking on stonily, with a feeling almost of indifference. I am beginning to be hardened to misfortune and inured to waiting. My cheeks burn a little, but it is the heat of the sun.

The pastor speaks cheerily. "Well, it is a pity you have lost it; but you must just make the best of it. You will get on to Dorpat on Monday. It only means a couple of nights at an hotel."

"All Sunday! To spend all Sunday in a place like Plescow!" exclaims the spinster. "And the expense too! Oh, to live in such a country!" She says a great deal more; and I agree to everything, but think of my ten roubles with considerable misgiving. The pastor, meanwhile, is looking about for a droschke for us, and is grumbling at the bad management which provides such scanty means of locomotion to travellers. There is, at present, not one to be obtained, and the railway station is more than a mile

from the town. Other passengers come from their tea-drinking and look anxiously down the long, straight road; but they are inhabitants of Plescow, and seem to know what to expect. They saunter back into the waiting-room, or pile up their effects outside the station, to be in readiness.

"I should recommend you to have a cup of tea or coffee," remarks the pastor. "You have no hurry; and must just wait until some of those lazy dogs turn up with their droschkes. They will come in shoals when they see the omnibus enter the town."

So we take his advice, and take our time over it, till we hear the sound of wheels on the gravel outside. The spinster of course becomes frantic again, for fear we may lose this chance also, and rushes to the door, followed, more sedately, by the pastor and myself.

"Do not excite yourself, my dear lady," he says; "there will be plenty of them, no fear."

And sure enough, there they come in long file, driving furiously to outstrip each other, as they gesticulate and shout to their little rough, hardy horses. They are principally Jews, so haggling prevails for some minutes. Our share of it is kindly undertaken by the pastor; and at last we are mounted on two high-wheeled, shaky vehicles, the spinster in the front, smothered in her *Handgepäck* (hand-luggage), to which she clings feverishly; and I — well, how that enterprising Jew driver managed to get to Plescow with my big box on his narrow perch beside him, will remain a mystery to me through life. I only know that extreme agitation prevents me from feeling that the skin is being slowly grated off my shins by the edge of my small box, which is wedged against them, and that we do eventually draw up before the door of the principal hotel, and that it — the big box — did *not* fall with a crash to the ground and burst, scattering my wardrobe to the four winds.

The hotel, kept by one Meyer, is over a baker's shop. We are shown into a large, bare room, with yellow painted floor, and two high, shadowless windows looking on to the street. A narrow strip of the room is partitioned off by a screen, behind which are two very small, musty-looking beds, two slop-basins and milk-jugs, which I afterwards discover to be intended for ablutionary purposes, and two chairs. An atmosphere of stale tobacco-smoke prevails, and the general effect is depressing. The spinster thinks otherwise; she observes on the size and airiness of the room, becomes quite chirpy and cheery over her toilet, and washes her face energetically in one of the slop-basins, which teaches me its use. After a time, I grow restless, and propose a walk about the town.

"Oh, my dear *Mädchen*," she replies, "who would think of walking in Plescow! There is nothing to see here."

"But," I entreat, "I would like to go; it is all new to me."

But she is not to be persuaded; so I go alone. She is right. Plescow possesses few beauties; yet the novelty of everything pleases me. I wander down the principal street, and stare up at the whitewashed, square houses, and into the small, scantily furnished shop windows, where I see nothing worth looking at. But a Russian priest who passes me, with his long, waving hair, ample silk gown, and high cap, excites my interest. I stop in front of a Russian church, with light green roof and white walls, and wonder who was the architect. The massive, clumsy tower leans all to one side. The door is open, and I peep in. A gendarme, who is standing by, invites me by a sign to enter, and I do so. Here, at least, is attraction. I can scarcely see at first for the blaze of tinsel and color; and long I gaze at the weird, brown faces of saints, which look out at me from their dazzling gilt haloes and gorgeous draperies. In front of me are golden folding-doors, closely shut; and a trellis, through which I catch glimpses of greater splendor. Above me is a pale blue dome, studded with large gilt stars. It is all so strange and fantastic, that it is only when the woman who has been dusting the church touches my arm and says something, pointing to the door, that I awake to the fact that it is getting late, and she wants to lock up. So I go back to the hotel, still awed by what I have seen, and burst upon the spinster with many questions and exclamations.

Then we have supper, which is not bad. The bread is excellent, and made up into fanciful shapes, which please my youthful imagination. But my enjoyment is marred by the dense vapors of the apartment. Matters have not improved during my absence; tobacco has been coming up through the floor in clouds, and is still doing so. And oh, my readers, have you any knowledge of the properties of *karria yaak?* Have you ever received one whiff of it into your nostrils? If you

have not, you cannot sympathize, nor can I describe. It is a thing to be smelt, not described. There is, moreover, a scraping of fiddles, a shuffling of feet, and a confused din below, which grows and increases as the hours wear on. The waiter invites "Fräulein" — meaning me — with a smile to join the ball, which he informs us is going on down-stairs in the *salon*. The spinster throws up her hands; but she need be under no apprehension. Fräulein feels no disposition to join the rabble rout, who would seem to dance with noxious tobacco-pipes in their mouths. At what appears to me an unreasonably early hour, the spinster proposes retiring to rest; and as she complains of fatigue and a desire to sleep, I have no alternative but to lay my unwilling head upon my dirty pillow, after first spreading a clean handkerchief over its sullied purity. Our candles are snuffed out; but, alas, "jocund day" does not "stand tiptoe on the misty mountain-top." I wish she did! In vain I toss and turn, making the wooden bedstead creak and groan dismally. The spinster snores — happy spinster! The fiddles squeak; the tobacco-smoke rises around me; the din increases. I feel deeply melancholy. I cannot describe the miseries of that night and that bed. Before I have fallen asleep, I am glad to desert it — for, to my horror, I find it is being invaded! Putting on my clothes, I resolve to sit up — much to the annoyance of the spinster, who has not apparently the objections to a populated bed that I have. To have her night's rest disturbed in this way is hard. She is sure there is no vermin; it is all my own imagination. A strange thing that *she* is unmolested. She hopes I do not intend to keep a light burning all night?

"No," I sorrowfully reply; "I will sit in the dark and be quite still."

I draw a chair to the table, blow out the candle, spread out my arms before me, and rest my aching head upon them. The leaden minutes creep on, and I listen in semi-stupefaction to the din below; then, I believe, from sheer exhaustion I fall into a doze, and dream many uncomfortable things, out of which I start at intervals. Suddenly, whether sleeping or waking, I become conscious of a renewed sensation. I raise my head, and my blood curdles. Something is slowly crawling over the back of my hand! I forget the spinster's anger. I lose all self-command, and shaking my hand wildly, I utter a scream of horror. I hear the complaining voice of the spinster again; but I am desperate. I grope for and grasp the match-box, strike a light, and look fearfully around me. There the thing is — and another, and another on the table and floor! The room is swarming with black beetles from the bakery down-stairs!

Now, if there is a living thing I abhor, it is a cockroach. I love mice, and could make pets of spiders; but at sight of a bloated, crawling cockroach my flesh quivers. And here are thousands! I shake myself convulsively and groan.

"I think, Fräulein, you might show some little consideration for others," I hear the spinster say in a deeply injured tone.

"It's no use — I cannot bear it," I cry. "This is worse than the Black Hole of Calcutta. I would rather be in a vault with dead bodies all night" [borrowing the idea from the unparallelled sufferings of Sindbad the Sailor], "or — or anything horrible, than be in this place!"

The spinster raves on, wobbling her night-cap frills at me; but I heed her not. I can bear no more, and lift up my voice and weep. After this, I obstinately refuse to put out the candle — the light scares away my foes — and retire to the far window-niche, gather myself together with my feet up, and wait, like a veritable Patience on a monument, for the dawn. I watch the flutter of her pearly skirts over the opposite chimneys, and catch her first rosy blush with fresh amaze at her mysterious beauty. The fiddles have stopped at last, the doors have ceased to slam, and a Sabbath calm reigns within and without. My weary head falls back, and I slumber sweetly in the face of the rising sun.

The spinster is stirring when I awake. Confused and dazzled with the full light, it is some moments before I can collect my scattered wits; but such is the elasticity of youth, that after wetting my hands and face in my slop-basin, and laughing at the wry face which the crazy-looking glass reflects back to me, I feel as fresh as a daisy and ready for anything. I have a burning desire to go to the service in the Russian church; but herein I meet with opposition. The spinster is scandalized at the suggestion; and, after breakfast, I am walking sedately with the spinster at my side, to the Lutheran church. I find it a dreary business. The slow, drawn-out hymns, so unlike our more lively Church music, seem to me to savor of funereal music. Of the

long sermon, I understand nothing; and I am glad when we can go forth once more into the bright sunlight.

At dinner, the waiter informs us that the band will play to-day in the Tivoli Garden. My heart gives a bound; but my English prejudice quickly repels the contemplation of such wickedness. To my surprise, however, when I have settled down at the window some time later to watch the people pass, the spinster herself suggests a walk in that direction; and, I blush to acknowledge it, I respond forthwith. So we go; and I hear a Russian provincial military band, to which I listen with bated breath as I try to follow the wraith of a tune which now and again struggles through the din of the big drum, to be speedily smothered by rebellious instruments. Yet withal, I enjoy myself under the lime-trees of that Tivoli Garden, though it looks more like a poor neglected demesne than a pleasure-ground. Flowers there are none, and the grass is trampled and patchy; but there are the officers with trailing swords; there are Russians, Poles, Letts, and Esthonians in their characteristic dresses. I could sit and watch till darkness fell; but the spinster has had enough of dissipation, and in an hour or two we turn our steps hotel-wards.

Another night with the cockroaches; but I am prepared, and that is half the battle. I persistently decline to go to bed, and refuse to be a single instant without a light. The spinster may grumble; in all other matters I knock under, but here I am firm. I again mount the window-niche, in which spot alone I feel safe; and with a rug for my pillow, I doze and start and slip into painful attitudes, until my last night in Plescow is of the past. I am up with the lark in the morning, and am ready to start for the boat, hours too soon. When at last our luggage is packed and ready to be borne away, and our bill is paid, which is moderate beyond all expectation — the one relieving feature of the Plescow hotels — the spinster shows the practical greatness of her German nature; she opens the jaws of a carpet-bag and deliberately empties the contents of the sugar-basin into it; then she possesses herself of the candle-ends, and drops them also in amongst the sugar-lumps. "It would be a shame to leave them," she explains. "We have paid for them. Will you take the half?"

I decline with thanks.

In another hour we are actually in the boat, Plescow is left behind, and we are on our way to Dorpat; my fare is paid, and I am the happy possessor of half a rouble!

TROUBLE THE FOURTH.

It is four months since that broiling August afternoon when I sat on the deck of the little steamer which runs between Plescow and Dorpat, watching the spinster sitting stolidly in the blaze of the sun behind a wall of miscellaneous belongings. I remember observing how the sun beat on the exterior of that carpet-bag of hers, and wondering whether the sugar and the candle-ends were amalgamating. I tell my friends now, as a prime joke, what then I regarded as a decidedly practical one, how we ran aground at the mouth of the Embach, almost within sight of our destination; how uproarious the spinster became, and what a wait we had for the turn of the tide to carry us over. But these are all things of the past, and I too am changed. I have grown, if not in grace, at least in experience. In my dealings with the Jew stall-keepers, I no longer give them what they ask for their wares, as I used to do in my innocent days, but have learned to haggle and bargain with tact and discretion, until I verily believe I procure my requirements at almost their legitimate value, though it is tough work.

Meanwhile, the scene too is changed. In place of dusty lime-trees, with drooping, listless leaves, and dazzling sunlight beating on the scorching white pavement, is the still more dazzling snow. The sun still shines, but with a cold, chilly splendor — brightness without warmth. The trees are draped in a new foliage, which glitters and flashes like myriads of diamonds. It is a rare day! It is twenty degrees (Reaumur) in the shade, and the air quivers and sparkles with countless crystals. They seem to remain stationary in mid-air, twinkling like tiny stars, and yet my muff is covered with them. There is not one exactly like another, so manifold is their beauty. I hurry along with shortcoming breath, for this kind of weather gives labor to the lungs, and on my arm I carry a small packet carefully sewn up in brown holland. My destination is the post-office.

Homo, like the monkey, is an imitative animal; and I am like the rest of my species. Everybody has been making Christmas presents for relations and friends at the approach of this festive time; why should not I do likewise? Why should

not I surprise my loved ones at home with some little gifts made with my own hands? Delighted with the idea, I have carried it into execution, and am now on my way to the post-office, with my thoughts away over the sea, in a gray, dingy, manufacturing town, where the sun is not shining clear and bright, as here, but struggling tearfully through smoke and fog; and yet, smoky, dirty, northern town, to be with thee even in thought, is to be happy! The post-office is in the centre of the town; and I am soon climbing the high stone steps, and push open the swing-door leading into the Parcels Expedition Department. As I enter, a wave of heated air, laden with tobacco, leather, and the perspiration of many races, closes round about me, and almost stifles me. The office is crammed with people waiting their turn. There the Russian, the German, the Jew, the Lett, the Esthonian, are represented. They are packed like bees in a hive; and the stove, which covers half the side of one wall from floor to ceiling, is heated to splitting, as it always is. A dead silence prevails, except for the curt questions of the official, and the replies of the fortunate individual who is being attended to. I take my stand ruefully at the outside of the crowd, and relieve myself of as many wraps as I can. Meanwhile, the swing-door behind me is in constant motion until I am hemmed in on all sides by fellow-sufferers of both sexes. I can see nothing but the backs of those in front of me, and the staring white face of a clock which looks down on me from a corner. It affords me grim satisfaction to watch her spider fingers crawl from minute to minute with laggard pace, and feel that I am slowly nearing the goal; and oh, what comfort when the mass is parted, and one more makes for the door, and we surge on one step nearer! But the heat is insupportable, coming from the sharp, thin air into this thick, scorching atmosphere; and long before I have reached the counter, I feel as if I must give it up, and return whence I came with my business unaccomplished. My head is swimming, my senses dazed, and my feet aching with the prolonged stand. At length, when I can count those before me, I take courage, buoyed up with the hope of approaching release. Now the broad shoulders of the Lett who has been forming the last barrier between me and that mighty dispenser of favors, the post-office official, have sidled away, and I stand face to face with the official. I look up into his square-jawed, stolid face, with its bushy eyebrows, as I hand him my packet without a word. He receives it silently at first, and looks at it until gleams of malice shoot over his fleshy face.

"What is this?" he asks.

"It is for England," I reply. "I have put it on the address."

He stuffs it roughly back into my hand. "We do not accept such parcels," he says. "You must sew it in oilcloth."

"But it is quite safe," I remonstrate.

He cuts me short with a wave of his hand. "It does not matter — such is the rule. Take it away, and sew it in oilcloth."

I still hesitate. All this waiting and suffering in vain — all to go over again. It is too bad.

He glares down upon me: "Now then, make room, will you?"

I quail, and move away, and my place is filled by another. I look up at the clock, which seems to mock me as she points to twelve. I have been two long, weary hours in this place, and all for nothing! As I hurry homewards, I inwardly resolve that no power on earth shall induce me to sew my packet in oilcloth and return to meet that official's leer on the morrow. No; I would rather throw the thing into the Embach — though I should have to make a hole in the ice to do it. But calmer thoughts come with the morrow, and I am now retracing my steps to the post-office with a broken resolve in my heart, and a small packet neatly stitched in oilcloth in my hand. But I am not the woman I was yesterday. My step is less elastic and swift; and as I mount the stone steps and enter upon the scene of yesterday's humiliation, my spirits are chill and gloomy. I have a longer wait to-day than yesterday, for it is one day nearer Christmas, and as the great feast-day approaches, the crowd at the post-office intensifies.

It is a long lane that has no turning; and behold me once more handing my packet over the counter with averted eyes, which fear to look defiance. The big, unclean hand closes upon it, and it is turned and twisted on all sides. "Ah, there is no flaw this time!" I exultantly think. At length he holds out that other fleshy hand, and I look up startled and inquiring.

"Your sealing-wax and seal!" he demands, whilst the gleams of malignity spread and deepen from the crow's-feet in the corner of his eyes.

"What?" I ask confusedly.

"Your seal — your seal!" — this time with brutal impatience.

"I — I have none," is my trembling rejoinder.

The parcel is thrust back into my hands. "It is no use coming here and troubling us with a packet like that; you ought to inform yourself of the regulations before you come here taking up people's time."

"What is the matter? I have sewn it in oilcloth, and done everything!" I reply desperately.

He turns from me insolently, and signs to the next comer to take my place.

This is more than human flesh and blood can bear in silence. I cast on my torturer a look which ought to have shrivelled him up like a leaf in the fire. "What do you mean?" I say, choking with anger. "Are you going to send this packet away or not?"

He has pulled a ledger towards him, and is writing something in it, or pretending to do so. But I know he is listening, for the hateful gleams spread thicker over his face. Presently he holds out his hand for the next packet. I turn round towards the sea of heated faces behind me, and inquire of the person nearest me: "Is it possible that what that man says is true, and that after waiting here hours, for two days, I must again return home with my packet? It is a shame — a shame!"

It happens to be a gentleman whom I am addressing. I recognize him to be one of the German professors at the university. As I finish, he pushes his way to the counter. "Look you," he says in a firm voice, "I would advise you to send off this lady's parcel." He takes it from my hand as he speaks. "You know as well as I do that you can seal it with the government seal, if you choose."

There is no reply. The man is doggedly examining the packet which he holds. The professor waits a minute, his eyes fixed upon him. "Good!" he says at length. Then turning to me, my champion continues in a clear voice, which may be heard all around: "I regret, young lady, that I cannot compel this man to send off your packet; but I hope I shall be able to punish him; it will not be my fault if I don't." He returns me my unfortunate packet; and as I take it, I cannot help stealing a sidelong glance at my foe. His face is crimson. I thank my champion, and am going, this time with a resolve which shall not be broken; when, to my surprise, the huge hand is held out once more. I can scarcely believe my eyes.

"Give it here!" he growls without raising his eyes.

I hand it back silently, and exchange glances with the professor, who is smiling behind his hand. It is all the work of a minute: the government seal is stamped on the ends of the string with which my packet is tied; I pay an exorbitant sum for its transport to England, and my trouble is at an end — but not my story. Five years later, when I am back in that smoky English town where I love to be, I learn that my packet, for which I had so dearly paid, both in body and in hard cash, had arrived long after it was due, and that my roubles had found their way to the insatiable pockets of the Russian post-office official. The packet arrived at its destination — unpaid!

From Fraser's Magazine.

THE LETTERS OF GOETHE'S MOTHER.

THE story of Goethe's mother has long been so far known to the world which takes so keen an interest in everything and everybody connected with its shining lights, that most of us have formed some idea of her in our private study of imagination. The facts of the great disparity of age and disposition between herself and her pedantic husband, of her dutiful wifehood, and extreme youth when she became the poet's mother call for our sympathetic respect, though we may hardly realize that she was a personage on her own account, and one who would have had the courage of her own opinions even had she not borne the name of Frau Rath Goethe, nor rejoiced in the reflected lustre of her son's glory. Yet her genial figure stands out distinctly against the sombre background of the burgher households of her kith and kin, and her catholic spirit escapes from the trammels of their narrow creeds. Among her intimate friends and frequent guests were the master minds of that generation, and she met noble and simple alike on that ground of equality where the aristocracy of nature laughs at the claims of long descent, and takes its stand on the broad basis of humanity. The great majority of the English-speaking races have perhaps never had the opportunity of seeing exactly what manner of woman she really was, until the present time; for though students of German literature have met

with many of her letters, and are aware that she was highly esteemed by her contemporaries, some parts of her correspondence have only recently been translated by an American physician, who died in the flower of his age just before placing his modest volume in the hands of a public by whom it has been warmly welcomed, as it issued from the press of Messrs. Dodd, Mead, and Co., New York.

The opening pages present us with a picture of tranquil bourgeois life in the free city of Frankfort in the early part of the eighteenth century, when the days were long enough both for work and play, and "fine old leisure" reigned supreme throughout the Fatherland. Weber is to modern ears an honored name, but it appears not to have been altogether satisfactory to at least one family who bore it, as we find that Wolfgang Weber, the great-great grandfather of our heroine, Latinized his patronymic by making it Textor, though posterity is blissfully unaware of the reason why he did so. His descendant, the honor-worthy councillor, Dr. Johann Wolfgang Textor, who became chief magistrate of Frankfort, was a serene, placid man who lived in a fine old house with a spacious garden where he amused himself in the intervals of business by tending his choice flowers and fruit trees in a pair of gloves of fearful and wonderful construction, presented to him annually at the Pipers' Court. He was a devout believer in dreams wherein a corner of the veil that hid his own future was lifted, though we do not hear that he ever foresaw the career of his gifted grandson. His wife was the confidante of his nightly visions, and the mother of a daughter born February 19, 1731, and named Catherine Elizabeth, who, in her eighteenth year, was married to John Caspar Goethe, an Imperial councillor, estimable in himself, and highly approved of by her parents. This worthy was the only son of a widowed mother who had for many years been the proprietress of a large hotel, but on the death of her beloved first-born boy retired from business to a house in the Hirschgraben. She spared no expense in giving her one remaining child what ought to have been a liberal education had he been a youth of liberal mind, and after he had come to man's estate and taken the degree of doctor-at-law at the University of Giessen, supplied him with abundant funds for travel which he spent in Italy. On returning to his mother and his native city he was anxious to secure municipal office, but failing to obtain it in his own way became soured and moody; and in this frame of mind turned his thoughts to matrimony, at the age of thirty-nine. The girl-bride, whom Rath Goethe won by the simple method of asking for her, was a tempting subject on whom to try his hand in the way of teaching, and he set about it in grim earnest. Writing from dictation, the study of Italian, singing, and music lessons, filled up her time, and the first holiday she had was when her son was born. She named him after her own father, and predicted that he would always be young in heart because he had his mother's youth as well as his own. A year later a little girl arrived who also lived and throve, but several other children died in infancy. By degrees, as the little ones grew older, their father began to consider that his wife's education was finished, and applied himself to the training and teaching of the olive-branches with so much zeal that the mother often had to act as mediator and peacemaker, striving to obtain freedom and pleasure for them as well as for herself. Music, drawing, reading, writing, dancing, history, geography, fencing, ancient and modern languages, as well as the inevitable Hebrew, were included in Rath Goethe's curriculum, and his son's many-sided mind took them all in, though he worked in a desultory fashion that was rather trying to the father.

With Cornelia the system was a failure; she did not inherit her mother's elastic joyous spirit, and bore her father's heavy yoke without much benefit to herself, as well as in a manner highly displeasing to him. The perfect love that casteth out fear was unknown to her nature, and the dry obstinacy of his own disposition was pitted against itself as transmitted to his child. She fulfilled her duties to the letter, but would have regarded a word or a minute beyond the appointed task as a work of supererogation, and bore her father a perpetual grudge for embittering her pleasures and debarring her from the enjoyment of those that fell in her way. Considering that when she was a woman grown the stern parent dictated all her letters to the absent brother, and insisted on the replies passing through his own hands, we must confess that she was rather hardly dealt by.

Rath Goethe was not without worldly ambition, and though a wealthy man had a keen eye to business, and a decided appreciation of money for its own sake and that of his family. Having carefully edu-

cated his son for the law, he sent him to the University of Strasburg as *studiosus juris*, and pictured to himself that when the young man had taken his doctor's degree they would work together at whatever legal business their intimate connection with the magistracy of Frankfort might bring in their way, and thus pursue dignified and studious lives and amass money by one and the same process. But

> The best-laid schemes of mice and men
> Gang aft agley,

and at Strasburg Wolfgang the "ever-young" made the acquaintance of Herder, boarded in the same house with Wieland, and was by the latter introduced to the family of Pastor Brion at Sesenheim, where he made ardent love to Frédérique, the best, sweetest, and purest of all the women who ever came under his spell for good or evil. Ossian and Shakespeare were the poets of the hour, read and re-read, recited and mentally garnered up for future use. Herder lent him "The Vicar of Wakefield," which he made his own in the same fashion, and law was in a sure way of being ousted by poesy.

His mental capacity, however, was great, and nothing came amiss to it, so on August 6, 1771, the illustrious academy of Strasburg awarded to the student Johann Wolfgang Goethe, *virum prænobilissimum atque doctissimum*, the magnificent honors and privileges of a doctor's degree, *summos in utroque jure honores et privilegia doctoralia*. What young man's path could be plainer? he was competent to be his father's partner, and might one day become also a councillor of Frankfort. The embryo poet turned his face homeward, introduced Wieland to the domestic circle, and wrote alas! not law, but "Goetz von Berlichingen." He saw and loved Charlotte, and immortalized her in "The Sorrows of Werther," and with his facile passion attached himself to Maximiliane Brentano, Lili Schönemann, and others, casting each woman's heart behind him as a broken toy when he had done with it. Fame now pursued the young jurist, and he was lionized to his own and his mother's hearts' content. It was a bitter pill to the old father when his cherished hopes were dashed to the ground, but pride was gratified after all, and the cosmopolitan strangers who came to the stately house in the Hirschgraben were received with formal yet generous hospitality. Wieland named it the *Casa Santa*, and Frau Rath or Frau Aja, as she was affectionately called, was scarcely second in popularity to her clever son. How the Duke of Saxe Weimar was among the guests, and how he persuaded Wolfgang Goethe to take up his residence at court as his guide, philosopher, and friend, is matter of history, and it is at this point that we enter on the mother's correspondence with Lavater, Wieland, and other friends who wish to have tidings of her son at Weimar. They were indeed all her sons and she their spiritual mother, and thus they mutually address each other: —

Frau Rath to Lavater.

Frankfort: June 13, 1777.

Dear Son, — God's blessing on you and all belonging to you. Here is a little book which I am directed from Weimar to send to you. Who the author is God knows.

But, dear son, what are you about? One hears and sees nothing from the good Lavater, who is to me so dear. With us it is as it is written: the heart of man is defiant and desponding. Since my children are no longer with me, everything depends on the letters we receive. From Weimar we have good news. Is Frau Schlosser (Cornelia) ill? perhaps dangerously? God knows! If the post were not about leaving, I could write more, but the little book has been here longer than it ought. Let us trust everything to the Lord; he is love, consequently all will go well. Greet wife and children, and rest assured that I am your faithful mother and true friend,

GOETHE.

N.B. Is it not so? You have forgotten the copper-plates which were for us; a portion of them belong to the first "Essay on Physiognomy;" and then there is the Herr Rath's portrait, and mine also.

A few days later Cornelia died in childbirth and left her husband with two girls to bring up as best he might. He ultimately married, as his second wife, Johanna Fahlmer, a dear friend of Frau Rath's, who was to her even as a daughter, and showed herself a true and tender mother to her husband's first family. The second letter to Lavater was written immediately after the bereavement.

Frankfort: June 23, 1777.

"He giveth power to the faint; and to them that have no might he increaseth strength." His word shall surely stand. New, living, present witnesses are we, who know that our Cornelia, our only daughter, is now in the grave; and, indeed, wholly unexpectedly; the flash and the stroke were one. O dear Lavater! The poor mother had much, much to bear. My husband had been ill the whole winter — the careless shutting of a door would startle him — and to him I had to be the mes-

senger of the death of his daughter, whom he loved above everything. My heart was as if crushed; but the thought "Shall there be evil in a city and the Lord hath not done it?" sustained me, so that I did not sink under my grief. Without a belief as firm as a rock in God — the God who numbers the hairs of the head, without whom no sparrow falls; who neither slumbers nor sleeps, who is never gone on a journey, who knows the thought of my heart before it is formed, who hears me without my having need to cut myself with knives and lancets till the blood gushes out; who, in one word, is love — without belief in him it would be impossible to bear any such thing. Truly man feels his own weak nature. Paul says, "No chastening for the present seemeth to be joyous," but it is one thing to feel, another to be discontented with God's leading, and to put one's self in the place of those who have no hope. But we who know that beyond the grave dwells immortality, and that our life, which is but a span long, may also soon be at its end, us it becometh to kiss the hand that chastens us, and to say (truly with a thousand tears), "The Lord gave, and the Lord hath taken away, blessed be the name of the Lord."

Dear son, your letter did me much good; and yet you are vexed with yourself that you cannot comfort us. But if I tell you that it was a cordial to me that I had open before me your whole warm, feeling, friendly heart; for if I only see a line of yours, all the happy moments occur to me when we ate at the same table, when you were under my roof, when you came at nine o'clock in the evening to my sitting-room, where I had hardly seen you a moment, and yet knew at once on which round of the long ladder on which my sons stand I should place you, and that I was not mistaken, how I wept the whole day of your departure — all this comes back to memory if I but see your handwriting on an address. Forgive me, dear son, that I go on scribbling so long. Know it is now one of my dearest occupations to write letters to the friends who are near to my heart, who share with me joy and sorrow. I live in this great city as in a desert. I have only one of the Fahlmers who understands me, and she is now, unfortunately, in Dusseldorf. Now, my dear friend, farewell; greet your dear wife. One thing more. I have received two excellent letters from my dear son Schlosser. He bears it as a Christian and a man, and believes in God. Now the Almighty bless you and all belonging to you. Keep your love for me; mine shall endure to the grave — yes, beyond it. This says, and will maintain,

Your faithful
MOTHER AJA.

Lavater, be it remembered, was a pastor as well as a physiognomist, and it was natural that Frau Goethe in writing to him should express her feelings in Scriptural language. The imagery and poetry of the Old Testament were, moreover, inwoven with her habits of thought and speech, and she had withal a simple cheerful trust in the All-Father which was evinced by her recommendation to her friends: "Don't lose your presence of mind because the wind blows roughly, and think of Wieland's words, 'Die Hand die uns durch dieses Dunkel führt,' — the hand that leads us through this darkness. The next letter alludes to a visit from the Duchess Anna Amalia of Saxe Weimar, to whose son, the reigning duke, Johann Wolfgang Goethe was privy councillor. She was the sensible, genial woman who had governed her little realm cleverly as regent, resigned it cheerfully when her heir attained his majority, and of whom Napoleon said after the battle of Jena, "Voilà une femme, qu'avec nos deux cent canons nous n'avons pu faire trembler."

Frankfort: June 26, 1778.

Dear Son, — The doctor has sent us, from Weimar, the fourth part of the "Physiognomy," but without plates, for which, as he says, we are to address ourselves to you. So, dear Lavater, the plates for the fourth part. We are sorry that we must trouble you so often, but, after all, one does not like to have imperfect books; and what would a "Physiognomy" be without plates?

I would gladly write you much and many things, but for to-day it is not possible — only this much, that we once more in this earthly life have had joyous days: the duchess mother has been with us. I care nothing for lauding and praising. One must always see things for one's self; everything else is wearisome twaddle; therefore I say to you nothing more than that we were delighted.

The doctor, thank God, is well and happy. Be sure to thank Kaufmann's wife for her dear little letter; I shall also write her soon. Your dear wife — of whom, this very day, a certain Herr Reinwald has told me everything that is good — greet her, too, a thousand times, the dear, good woman.

Kiss your children, remain our friend, as you know that we to the end of our days are your true friends.

C. E. GOETHE.

The duchess thenceforth became one of Frau Aja's most lively correspondents, and her sprightly though deformed maid of honor, Fräulein von Gochhausen, another. They gave her sparkling descriptions of the life at Weimar, expressed the heartiest personal affection, and filled up her cup of happiness by chanting the praises of her son. She answered them both in her own strain, telling of her quiet life, of the young girls she loved to gather round her on Saturdays, and sent H. S. H. a store of dainty biscuits as any other good *Hausfrau* might do to her friend.

The duke himself made her acquaintance, and occasionally wrote her a few lines. Wieland, who also was at Weimar, sent her the most loving letters, and after a time Goethe took Friedrich von Stein, a little page in the ducal household, of whom he vas very fond, to Frankfort, where Frau Rath taught him the "philosophy of a cheerful life," and gave him a place among her many sons. Before passing on to a new series of letters we must just observe that the stern but upright Herr Rath died in May, 1782; but, though his widow mourned him sincerely, he had been more of a master to her than a husband, and the light of her life was not quenched in his grave. The following extract from a letter to the duchess mother is dated October, 1782, about five months after his death: —

Wit — I look upon it always as a draught of air; it cools, indeed, but one gets a stiff neck from it. . . . Every pleasure that I now wish to enjoy I must seek for among strangers, out of my own house, for here it is quiet and deserted as in a graveyard. Formerly it was, indeed, wholly the contrary; yet since throughout all nature nothing remains in its place, but goes around in ceaseless revolution, how could I make myself an exception to this? No; Frau Aja has not such absurd ideas. Who will fret himself because it is not always full moon, and because the sun does not warm us so much now as in July? By only using well the present, and never thinking that it might be otherwise, thus one gets best through the world; and the getting through is, after all (everything well considered) the chief thing. Your Serene Highness will be able to make out tolerably well from the above that Frau Aja is always still about the same Frau Aja; retains her good humor, and does everything to keep in good spirits; also uses diligently the means which King Saul formerly found so approved against the evil enemy; and thus, according to human appearances, there is, for a long while yet, no fear for the good woman. Especially as Herr Tabor, whom your Serene Highness knows at least by name, has so magnificently provided for our amusement. The play for the whole winter! there will be fiddling, there will be trumpeting! Ha, I would like to see the devil who would have the courage to plague one with the blues; a single Sir John Falstaff puts him to rout; there was fun with the fat fellow. Christians and Jews all laughed away the gall from their hearts. This week we are to have Clavigo; all Frankfort is going — all the boxes are bespoken already — for an Imperial city like this it is a great enjoyment.

The next letter to the same august personage is six months later: —

March 1, 1783.

Most Serene Highness, — I am indeed a very happy and enviable woman, to stand in the recollection and favor of an Amalia! of a princess who in every respect is truly a princess; who has shown to the world that she can govern; who understands the great art of attracting all hearts; who diffuses love and joy around her; who, in one word, was born as a blessing to mankind. So, then, our dear hereditary prince is well — a thousand thanks to God for it! I should never forgive Wieland and my son if they did not, at this joyous event,* ride lustily their Pegasuses; and I heartily long to see their productions. To be sure, it seems to me as if my son had quarrelled with the Muses about something, yet old love never rusts; they will, at his call, be soon again at hand. With Wieland it is, indeed, far otherwise; he is an ever constant lover. The nine maidens may laugh or look sour; he accommodates himself to all their caprices; and I know, from a trusty source, that anything of this kind these ladies take extremely well. Your Serene Highness is so gracious as to ask how I am. I am very well, thank God; happy and light of heart, and seek to make my little bit of life as agreeable as possible. Yet I do not like any pleasure that is attended with disquietude, confusion, and fatigue; for quiet I loved at all times, and to my body I pay very willingly the honor due. In the morning I attend to my small housekeeping and other matters; letters also are then written — such a ridiculous correspondence no one could easily have except me. Every month I put my writing-desk in order, but I can never do it without laughing. It resembles heaven inside of it. All distinctions of rank abolished — high and low, righteous, and publicans and sinners, all in a heap. A letter from the pious Lavater lies quiet without ill-will beside one from the player Grossmann, etc.

In the afternoon my friends have permission to come and see me; but by four o'clock they must all be gone, for then I dress myself, go either to the play or make visits, and come home about nine o'clock. This is now about what I do. Yet the best I had nearly forgotten! "I live in the long streets which have been built for readers," etc. May your Serene Highness be content with the description of my insignificant way of life, and keep for me your inestimable favor. This is the single request of

Your Serene Highness's most obedient and faithful servant, GOETHE.

Very characteristic is the following note written to Frau von Stein, her son's friend and Friedrich's mother: —

Nov. 14, 1785.

Gracious Lady, dearest Friend, — I was very glad that your son was so pleased with his stay with me. I have done everything at least to

* The birth of a son to the duke, Feb. 2, 1783.

make my native city agreeable to him, and rejoice that I have been successful. True, I have the grace from God, that as yet no living soul has ever left me dissatisfied, of whatever age, rank, or sex. I love human kind, and old and young feel it. I go without pretension through the world, and that pleases all earth's sons and daughters. I demoralize no one, always seek to spy out the good side, and leave the bad one to him who created man, and who best understands how to smooth off the sharp angles; and by this method I find myself well, happy, and content; with which I have the honor to remain and commend myself most respectfully to further good will and friendship, and to subscribe myself, gracious lady,

Your most obedient servant and friend,

ELIZABETH GOETHE.

Frau Rath had also a voluminous correspondence with the actor Unzelmann, but it would be difficult to pick out any of the letters that would stand alone without context, so we must make a leap of nine years and give in the next place a charming little epistle to Louisa Schlosser, the daughter of Cornelia, who was about to be married: —

March 24, 1794.

Dear Louisa, — Thou seest how God, even here, rewards good children. Is not thy marriage almost a wonder work? And that everything should so dispose itself that now thy dear parents and brother and sisters go with thee, that would not have so easily happened had not war come into the country. Mark this for thy whole life: the God, who can of stones raise up children unto Abraham, can turn everything, which we with our dim eyes regard as misfortune, to our good. Now, dear Louisa, thou, the only one remaining to me from a precious and ever loved daughter, God bless thee! Be the faithful companion of thy future excellent husband; make his life to him as joyous and happy as is in thy power. Be a good wife and a German housewife; thus will nothing be able to disturb thy inward peace, the quiet of thy soul. Hold, also, thy grandmother dear in the greater distance. My blessing accompany thee wherever thou art, and I am always

Thy faithful grandmother,

GOETHE.

In May, 1795, being much disturbed by the alarms of war, and very lonely, Frau Aja sold her handsome house in the Hirschgraben; for though her son was born there, and it had been rebuilt with every convenience during the early years of her married life, it was so large as to be a burden to her, and Herr Blum, a wealthy wine-merchant, became its purchaser. The bright old lady removed with some of her most cherished household gods and a couple of faithful servants to apartments on the Rossmarkt, the windows of which looked down the whole length of the busy Zeil. Here she spent her time in reading, playing on the harpsichord, chess, and lacemaking. Now white lace requires good sight, and is usually made by young persons. As years advance and the eyes fail, inveterate lacemakers change the white thread for black silk because each separate line of black stands out distinctly on the white or yellow ground of the parchment on which the pattern is traced. We may judge, therefore, that Frau Rath's sight was exceptionally well preserved, as we find that in 1796 she has made on her pillow all the fine white lace to trim the clothes for an expected great-grandchild.

Jan. 30, 1796.

Dear, good Louisa, and excellent housewife, — Here comes the great-grandmother's work. A thousand to one I am the first great-grandmother who has woven the lace for her great-grandchild's baby-clothes; and in this case, as inspection shows, not mere lirum-larum, but a very handsome Brabant pattern. How beautiful the little creature will look in it! Before thou gettest it, I shall write again to thee and thy excellent husband, whom I am proud of as a grandson. For the present, farewell. For now the rarity must be packed and speedily sent off, that the great-grandchild may not arrive before the things. Greet thy dear husband.

From thy faithful grandmother,

GOETHE.

When the "young citizen of the world," as Frau Rath styled the little stranger, arrived, her thankfulness overflowed in a long letter of which we can only give the earlier part: —

April 5, 1796.

Now all thank God, with heart, mouth, and hands, who doeth great things. Yes, indeed, to you, to me, to us all, has he anew manifested himself as he who is good and whose goodness endureth forever. Blessed be his holy name. Amen. Dear children, God bless you in your new relation! The name of father and mother is honorable. Oh! what joys await you; and fortunate little boy, to enjoy being brought up by such excellent parents and grandparents! How carefully, my little darling, wilt thou be cherished both in body and soul; how early will good seed be sown in thy heart; how soon everything be rooted out which might mar the beautiful image of God which thou bearest in thee! Thou wilt increase in stature, wisdom, and favor with God and man. Thy great-grandmother can contribute nothing to all this good; the distance is too great. Be glad, dear John George Edward, the great-grandmother cannot bring up children; is not at all suited to it — does

everything they wish when they laugh and are friendly, and whips them when they cry or make wry faces, without examining into the reason why they laugh, why they cry; but I will love thee, heartily rejoice in thee, remember thee much and often before God, give thee my great-grandmotherly blessing — yes, this I can and will do.

A few extracts from this cheerful woman's letters to her poet son are among the pithiest of her published correspondence. She evidently accepts his relations with Christiane Vulpius as large-minded people do accept the inevitable, regards her as his wife in everything but name, and has a warm heart and tender blessing for her children. In July, 1796, the French bombarded Frankfort which the Austrians were endeavoring to hold, and Frau Rath placed her most valuable effects in a fire-proof cellar and crossed the river to Offenbach, whence, however, she speedily returned and wrote to Goethe on August 1: —

Our present situation is in every respect very unpleasant and critical. Yet, to worry myself before the time, or perhaps lose heart, was never my way. To trust in God, to use the present moment, not to lose one's head, to guard one's worthy self from illness (for anything like that would now come at a very inopportune moment); as this course has always heretofore turned out well for me, I intend to persist in it.

Although well read in all the best German and Italian authors, Frau Aja was not at all "blue;" and, glad as she was to meet with clever and sensible people in a friendly way, did not care for lionizing, or perhaps the truth was that she had had so much intercourse with the leading spirits of the age as made her indifferent to and even contemptuous of stars of lesser magnitude. Something of this tone pervades the following note: —

Jan. 13, 1804.

Frau von Staël is now, as I hear, in Weimar. She weighed upon me as if I had had a millstone hanging about my neck. I went out of her way everywhere, refused all companies where she was, and breathed more freely when she was gone. What does the woman want with me? I have never in my life written even an ABC book, and my good genius will in future also guard me from it. Greet your dear ones.

A charming letter, written less than a year before her death, must be given entire: —

Oct. 6, 1807.

This fair was rich in professors; and as a great portion of thy reputation is reflected back on me, and people fancy I have contributed something to thy great talents, they accordingly come to look at me. I do not, then, put my light under a bushel, but on a candlestick. True, I assure people that I have not in the least contributed to that which has made thee a great man and poet (for praise that does not belong to me I never accept); besides, I know very well to whom the praise and glory belong; for toward thy organization within me, as all was placed in thee already in the germ, I have truly done nothing. A grain of brain more or less, perhaps, and thou wouldst have been a very ordinary man, for where there is nothing within, nothing can come out. Judge thou, all the female philanthropists in all Europe could not give that. Good useful men — yes, that I will allow; but here the question is of the extraordinary. So, then, my dear Frau Aja, thou hast most properly and justly given the honor to God, as is fair and right. Now, in regard to my light which stands on the candlestick and shines pleasantly in the professors' eyes. The gift which God has given me is a lively descriptive power of all things that come within my knowledge, great and small, truth and romance, and so on. As soon as I enter a circle, all are bright and cheerful while I narrate. Thus I talked to the professors, and they came and went delighted. That is the whole trick. Yet one more thing belongs to it; I always make a friendly face, which pleases people and costs nothing, as our blessed Merck used to say.

I long very much for the Blocksberg — that was a silly expression — one might think I was awaiting with anxiety the 1st of May. So then, for the description of thy Blocksberg I am waiting; thus it is better expressed. Greet old friends.

At the end of October Frankfort was full of soldiers, the Imperial Guards by thousands on foot and horseback passing through to Mainz, going along the streets with flying colors and being reviewed in the market-place. Frau Rath enjoyed the stir and bustle, the stately sights, and military music amazingly; and wrote to her son: —

Anything like this the world has not seen; all as if they came out of a cupboard — not a stain, not a spot; and then the splendid music. It is with me as with the dog in the fable; stave it off I cannot. I will not let myself be torn in pieces; just like the dogs I eat with the rest. Which is, being interpreted, I cherish life while yet the taper glows, seek for no thorns, snatch the little joys, stoop if the doors are low; if I can push the stone out of the way, do so; if it be too heavy, go round it; and thus every day I find something that rejoices me, and the key-stone, belief in God. That makes my heart glad and my countenance joyous. I know that it is well with me and mine, and that the leaves do not even wither, to say nothing of the stem. To-day we have been

notified of a large quartering of soldiers, the above-named 2,372 men. I must regale them with roast pork.

The infirmities of age were very trying to one so active and independent, and clouded her bright spirit for a time. But she told a friend that at last she gave herself a good scolding: "Ay, art thou not ashamed of thyself, old Rathin! Thou hast had good days enough, and Wolfgang besides, and now when the evil days come thou shouldst make the best of them, and not pull such a wry face! What does it mean that thou art so impatient and naughty when the blessed God lays a cross on thee? Dost thou want, then, to walk upon roses forever, and art past the goal, over seventy years old?" After this she was somewhat relieved, adding, "I grew better because I was no longer naughty."

When death approached she was quite ready to go, and arranged all her affairs up to the last, giving minute directions for her funeral, how the cakes were to be made, and what wine should be offered to the guests. She was buried in the very heart of Frankfort, in a churchyard, which is now a recreation ground and public promenade. The grave is near one of its gates, and is marked by a simple tablet, inscribed, "Das Grab der Frau Rath Goethe," with the dates of birth and death. It is probably just the resting-place she would have chosen, for she was not the kind of woman who cared to live alone with nature, or inhabit a lodge in a wilderness. The hum of the city is within hearing, the children play on the stones, the great heart of humanity throbs around, and men and women from all the ends of the earth turn aside to glance for a moment at the tomb of Goethe's mother.

ELIZA CLARKE.

From St. James's Gazette.

SILK-GROWING IN BURMA.

REARING silkworms, though a very profitable occupation, is not looked upon with any favor in Burma. To get the silk the pupa must be killed; and the taking of life of any sort is an impiety always looked upon with great horror by all rigid Buddhists. Silk-growers are classed together with professional hunters and fishermen. The four states of punishment yawn for them, and their portion will be in the lowest abyss of *gna-yeh*, the lowest hell. Still there are colonies of silk-growers in various parts of the country; but they live apart from the rest of the inhabitants, as a rule, and often have entire villages to themselves. Colonel Horace Browne, who paid some attention to the industry in his district, states that the cultivators near Prome, where more silk is produced than in any other part of Burma, are nearly all Yabehns — a race of the same stock as the Burmese, but despised by them independently of their crime in the way of taking animal life. They usually live on the hillsides, occupying themselves, like the poorer Burmans and Karens, with *ioung-ya* cultivation: that is to say, clearing the forest lands on the mountain-slopes, burning the felled timber just before the rains, and then sowing the ground (thus enriched by the wood ashes) with rice, cotton, or oil-seed. The system is laborious and not viewed with much favor by the authorities; for the toung-ya soil, hardly exhausted by the single crop grown off it, immediately produces a dense forest growth of no use to anybody. Silk production is a much simpler matter, involving the least possible amount of toil and at the same time being very much more profitable. Moreover, the Burmese mulberry-bush, which is quite distinct from the ordinary *Morus Indica*, does not grow well on alluvial soil. It flourishes, however, on the hill-sides, where the Yabehns mostly live. The silk obtained from caterpillars nourished on the leaves of the hill shrubs is very much better than that obtained from lowland mulberry-bushes. Thus it happens that the richer Burmans down in the alluvial plains have not the same temptation to impiety which confronts the Yabehns up in the hills; and the number of silk-growers, is, for a similar reason, limited.

It is certain that neither the silkworm nor the mulberry-bush are indigenous in Burma; and, as Colonel Horace Browne points out, it is more probable that both were introduced from western China, down the valley of the Irrawaddy, than that they came over the hills, through turbulent mountaineers, from India. The shrub does not grow much more than ten feet high, and seldom produces good succulent leaves for a longer period than three years. After that the plants are apt to get coarse and stringy, and the cultivators ordinarily abandon the plantation or root out the bushes and plant new ones. The shrub will not flower, and has therefore to be propagated by cuttings. The Burmans call it the *poh-tsa-bin*, "the

tree the silkworms eat." There is another tree — that from the bark of which the Burmese get the coarse paper used for their *parabeik*, or note-books, the leaves of which the caterpillars will eat; but the silk thus obtained is much coarser, and recourse is therefore had to the *mahleing bin* only when the mulberry-trees give out. In any case, however, the silk produced in Burma is of a very inferior kind. It is rough and coarse; but it is all the better suited for the strong *loongyees* and *putsoes* in use for ordinary every-day wear among the Burmese, the finer cloths all coming from China or Manchester.

The whole process of growing the silk is of the simplest possible character, and is exactly suited to the Burmese were it not for the necessity of killing the pupæ. Silk can, indeed, be spun from the cocoons out of which the moths have escaped; but it is very much coarser even than the ordinary silk and commands somewhat less than half the price. Except the occasional trouble of strolling out for a few leaves, there is almost nothing to be done; and the whole operations are carried on in the rickety bamboo hut of the cultivator, within a yard or two of the place where his food is cooked. The caterpillars do not seem to care a whit for the smoke or the dirt; and the pupæ are equally callous to the fumes of tobacco which circle about them constantly during the few days that remain to them before they are stewed. The female moths are placed upon pieces of coarse cloth with palm-leaf lids put over them. The eggs stick to the cloth, and form a compact little circle. A day or two over a week suffices to produce the larvæ, and these are then thrown upon flat trays, made of strips of bamboo plaited closely together and guarded by a slightly raised edge. For four or five days the little caterpillars are fed on finely chopped mulberry-leaves, the tenderest that can be found. After that they change their skins and, beyond getting plenty of leaves, do not receive much attention. They are sturdy creatures, and they would need to be, for they are often very roughly treated. The trays are scarcely ever cleaned, and if the larvæ are to be shifted from one tray to another, they are scraped up in handfuls and thrown down as if they were bits of wood. Gauze or mosquito-netting is usually thrown over the trays to keep away the ichneumon flies which otherwise deposit their eggs in the silkworm's skin, which of course kills him. In about a month's time the caterpillar is full grown. He is then bundled into a fresh tray; in which there lies, wound about in the form of a spiral, a narrow plaited bamboo strip. The ripe larvæ are thrown into this with as little ceremony as if they were pebbles. In about a day's time they have spun their cocoons, fastening them to the slips of bamboo. These are torn off and kept in baskets for a day or two, when a pot with water in it is filled with the pupæ, which are set to simmer over a slow wood fire. From a triangle over the pot is suspended a small bamboo reel, and down below near the pot is a wooden cylinder. The reeler is usually a girl. She fishes about after a time in the simmering pot, and, catching a few threads of silk, passes them over the reel and down to the cylinder, to which they are fastened. She then turns the handle of the cylinder, winding on the silk, and at the same time constantly fishing up and fastening on new filaments, which she does by means of a light bamboo double-pronged fork. Not the least trouble is taken to keep the silk clean. Any rubbish that may be floating on the surface of the water is wound on to the cylinder without an attempt being made to disengage it. When all the silk has been got off the cocoons and wound on to the cylinder, the pupæ are taken out of the water and fried in oil to furnish a dish for the family dinner. They are not by any means unpleasant — tasting, barring the oil, very much like roasted chestnuts; and indeed the dish is considered a great dainty.

The silk-growers mostly sell their silk. A loom is to be found in almost every Burman's house in the country; and in Prome and Shway-Doung, as being close to the place where the silk is produced, great quantities of articles of dress are made for sale. The native-grown silk is only used for every-day clothes of simple patterns; the more elaborate being all worked from imported Chinese silk. The silk is bought raw, the separate filaments twisted into a thread by means of a wheel, and then made up into hanks. These are boiled in soap and water and are then ready for the dye. The commonest colors are green, yellow, orange, different shades of red and light blue: black and dark blue are only in favor with the Shans. The dyes are obtained from various jungle seeds, roots, flowers, leaves, and barks; the yellow dye obtained from the wood of the jack (*Artocarpus integrifolia*) being reserved for the monkish robes. After being dyed, the thread is unwound

again. The weaving machine is very much like the old handloom still occasionally seen in out-of-the-way parts of England. The operators are almost always young women; and they are very clever at working the treadle and shooting through the shuttle, while talking all the time to village gossips or admiring swains. Some of the *tamehns* (the women's dresses) are extremely intricate in pattern, and require between twenty and thirty shuttles. The treadle raises and lowers the alternate threads of the warp. Except the rough dresses and the most complicated in pattern, however, not many native-made clothes are worn now. The townspeople prefer the showy and cheaper imported articles; and, though the Manchester goods are too frequently adulterated and do not last long, yet this does not trouble the Burman much; for he is fond of a change of dress, and, unless he is poor, will never wear a *putsoe*, except about his house, after it has been washed. All the more elaborate designs are, however, native-made. The "dog's-tooth" pattern is almost confined to Mandalay court looms. The *achit putsoe* or *tamehn*, of a wavy complicated design, which middle-aged Burmans remember as being the cherished object of desire of their young days, is now considered rustic. Young Rangoon will tell you that you always know a Tau-tha (a jungle Wallah) at the pagoda feast by his wearing an *achit putsoe;* and although it may cost from one hundred and fifty to three hundred rupees, that does not redeem it in their eyes. SHWAY YOE.

From The Athenæum.

VERSES BY SCOTT.

4 Quai de la Douane, Boulogne-sur-Mer.

I HAVE some unpublished lines of Sir Walter Scott which you may like to give to the public. Their origin is interesting equally in an artistic, literary, and psychological point of view, showing out of what few and simple elements a genius like Scott could, with hardly an effort, concoct a pleasing story. My late father, an architect, was a friend of Scott's, and helped him as a friend in the decoration and finishings of Abbotsford. Scott would often dine with my father when in London, and was greatly interested in the garden. In one corner there was some rockwork, in which were inserted some fragments of stone ornaments from the ruins of Kilburn Priory; and crowning all was a large, irregularly shaped stone, having a deep red stain, no doubt of ferruginous origin. This stone was sent to my father by Lord Mulgrave in one of his cement vessels, my father having been struck with its appearance on the shore at Whitby; and from these simple, really unconnected facts Scott made out the following story, in verses which might be regarded as a kind of friendly offering in return for services rendered. Here are the lines; I had supposed them lost, but my sister, in turning over some old papers, found a copy: —

THE MUCKLE STAIN OR BLEEDING STONE OF KILBURN PRIORY.

For the blessed rood of Sir Gervase the good
The nuns of Kilburn pray;
But for the wretch who shed his blood
No tongue a prayer shall say.

The bells shall ring and the nuns shall sing
Sir Gervase to the blest,
But holiest rites will never bring
His murderer's soul to rest.

Now tell me, I pray, thou palmer grey,
Why thou kneelest at this shrine,
And why dost thou cry so eagerly
Upon the help divine?

Oh, tell me who the man may be,
And what his deadly sin,
That the Church's prayer for his soul despair
The mercy of Christ may win. —

I cry at this shrine on the help divine
To save the soul of one,
Who in death shall lie ere morning light
Upon this ancient stone.

Sir Gervase rode forth far in the north
To Whitby's holy see;
In her bower alone his lady made moan,
A fairer could not be.

His false brother came to the weeping dame:
Oh, I love you dearer than life. —
Hence! would you win to shame and sin
Thy brother's wedded wife? —

He is far away, thou sweet ladie,
And none may hear or see,
So, lady bright, this very night,
Oh, open your door to me.

Sir Gervase rides forth far in the north,
'Tis long ere he comes back,
And thine eyes shine out like stars by night
From thy hair of raven black. —

The fire shall burn at the doorstone
Ere I open my door to thee,
And thy suit of hell to Sir Gervase I'll tell,
And a traitor's death thou wilt die. —

Then fare ye well, Dame Isabel,
Thou lady of mickle pride;
Thou shalt rue the day thou saidst me nay,
When back to thee I ride.

The day declined, the rising wind
Sung shrill on Whitby's sands;
With ear down laid and ready blade,
Behind a rock he stands.

Sir Gervase rode on in thought alone,
Leaving his men behind;
The blow was sure, the flight secure,
But a voice was in the wind:

False brother, spur thy flying steed,
Thou canst not fly so fast,
But on this stone where now I bleed
Thyself shalt breathe thy last.

That stone was then on Whitby's shore,
And now behold it here!
And ever that blood is in mine eye,
And ever that voice in mine ear! —

Now, thou palmer grey, now turn thee, I pray,
And let me look in thine eye.
Alas! it burns bright with a fearful light
Like guilt about to die.

That stone is old, and o'er it has rolled
The tempest of many years;
But fiercer rage than of tempest or age
In thy furrowed face appears. —

Oh, speak not thus, thou holy man,
But bend and pray by me,
And give me your aid in this hour of need,
Till I my penance drie.

With book and beads, with ave and creed,
Oh, help me while you may;
When the bell tolls one, oh leave me alone,
For with me you may not stay.

Sore prayed the friar by the grey palmer
As both knelt o'er the stone,
And redder grew the blood-red hue,
And they heard a fearful groan.

Friar, leave me now, on my trembling brow
The drops of sweat run down,
And alone with his spirit I must deal this night
My deadly guilt to atone.

By the morning light the good friar came
By the sinner's side to pray;
But his spirit had flown, and stretched on the stone
A corse the palmer lay.

And still from that stone at the hour of one —
Go visit it who dare —
The blood runs red and a shriek of dread
Pierces the midnight air.

As a little boy I determined to go and sit on that stone in the night, and at last conquered my fear and sat there triumphantly, and have never feared anything since. H. G. ATKINSON.

THE PEOPLE'S RIGHTS IN JAPAN. — The Western proverb says, "Heaven helps him who helps himself," which is very true, so self-help is the way by which one can secure almost anything. A man cannot get a cupful of food in idleness, nor can he obtain the knowledge of a letter in sluggishness. When this is true even in these small matters, how much more does it hold good when we desire to attain and secure immense riches, or everlasting fame? If a man possesses industry and courage, it is not impossible for him to accumulate great wealth, as in the case of To (an ancient Chinese who attained great riches), nor is it difficult to secure everlasting fame, as in the case of the Saint (Confucius) and the sages of antiquity. Then, advance brethren, and secure them! Why do you not dare the issue? We must first seek and secure a means by which the riches or the fame, when once acquired, can be safely preserved; thus securing the fruits of perseverance and courage. What would be the means? They are the rights of the people which, if permanently obtained, riches once acquired will not be lost by injustice, nor will fame once obtained be tarnished by wrong. In fine, all things will be perfectly secured to those who procure them by labor and courage. A nation can only fully appreciate industry and valor when in possession of the inherent rights of the people. Therefore Europeans and Americans labored to secure these rights, even by sacrificing their lives and properties, because their liberty was dearer to them than life, and more precious than property. What a man covets eagerly is often clutched tenaciously by the possessor. This fact must be well considered. The fruitlessness of violent measures to obtain the rights of the people is fully illustrated in the histories of foreign countries; among which England and France are the most conspicuous. Our earnest advocates of the people's rights will do well to consider what would be gained and what lost from the histories of those two nations, and consider the measures which they may resort to under varied circumstances. Deep meditation, calm patience, and determined courage, will all contribute towards the final acquisition of our rights. Go on, go on, and try to secure them! Yet, let our leaders take for their mirror the bright examples mentioned in the English and French histories, which are not only useful to us, but to all in similar circumstances.

Translated from the *Osaka Nippo*.